SOIL SURVEY

Montgomery County, Illinois

OUR SOIL * OUR STRENGTH

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
ILLINOIS AGRICULTURAL EXPERIMENT STATION

Issued August 1969

Major fieldwork for this soil survey was done in the period 1958–63. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1965. This survey was made cooperatively by the Soil Conservation Service and the Illinois Agricultural Experiment Station as part of the technical assistance furnished to the Montgomery County Soil and Water Conservation District.

Illinois Agricultural Experiment Station Soil Report No. 86.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Montgomery County contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in determining the worth of tracts of land for agriculture, industry, or recreation.

Locating Soils

All of the soils of Montgomery County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the county in numerical order by map symbol. It shows the page where each kind of soil is described, and also the page for the management group, woodland, or any other group in which the soil has been placed.

Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils in the soil descriptions and in the discussions of the management groups.

Foresters and others can refer to the section "Use of the Soils as Woodland," where the soils of the county are grouped according to their suitability for trees.

Engineers and builders will find, under "Use of the Soils for Engineering," tables that give engineering descriptions of the soils in the county and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Genesis, Classification, and Morphology of Soils."

Students, teachers, and others will find information about soils and their management in various parts of the text, depending on their particular interests.

Newcomers in Montgomery County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "Facts About the County."

U.S. GOVERNMENT PRINTING OFFICE: 1969

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402

Contents

Issued August 1969

This page intentionally left blank.

SOIL SURVEY OF MONTGOMERY COUNTY, ILLINOIS

BY C. E. DOWNEY, SOIL CONSERVATION SERVICE, AND R. T. ODELL, UNIVERSITY OF ILLINOIS

FIELDWORK BY C. E. DOWNEY, R. L. ALLISON, F. N. CARROLL, D. R. GRANTHAM, D. B. PHILLIPS, B. J. WEISS, AND R. F. WICKS, SOIL CONSERVATION SERVICE,[1] AND R. H. ANDERSEN, J. B. FEHRENBACHER, C. J. FRAZEE, P. R. JOHNSON, C. D. SOPHER, AND L. P. WILDING, UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE ILLINOIS AGRICULTURAL EXPERIMENT STATION

MONTGOMERY COUNTY is in the southwestern part of Illinois (fig. 1). It is bounded on the west by Macoupin County, on the north by Sangamon and Christian Counties, on the east by Shelby and Fayette Counties, and on the south by Bond and Madison Counties. The county occupies 706 square miles.

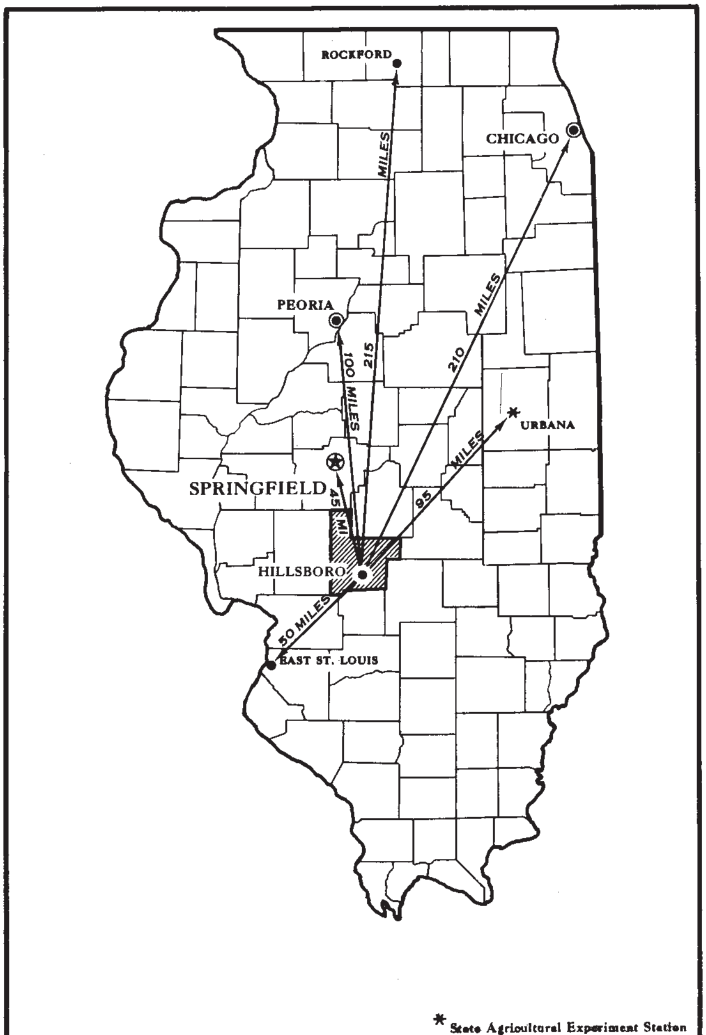

Figure 1.—Location of Montgomery County in Illinois.

Most of the people are engaged in farming, in providing services and supplies to farmers, or in marketing agricultural products. On most of the farms, grain crops are the main source of farm income, but dairy cattle, hogs, and beef cattle are an important source of income on many farms. Corn and soybeans are the main crops, but wheat, oats, and hay crops are also grown. Soils that are poorly suited to field crops are generally used for pasture or trees.

Some of the soils in the county are easily eroded. Improvements in drainage are needed for others, but drainage has been improved in most places. Still other soils contain a fragipan or have a subsoil that is high in exchangeable sodium. In the main, however, the soils are well suited to farming.

Facts About the County

This section provides general information about Montgomery County. It describes the climate, briefly discusses the agriculture, and gives facts about the transportation and industrial development. The agricultural statistics are mainly from recent records of the U.S. Bureau of the Census.

In 1816 the first white settlers came to the area that is now the southern part of Montgomery County, and the county was established in 1821. The boundaries of the county were changed to some extent in 1827, but the present boundaries were established in 1839. The early settlers bought their farms from the government by paying an entry fee of $1.25 per acre.

The population of the county reached a peak of 41,403 in 1920 but had declined to 31,244 by 1960. In 1960 Hillsboro, the county seat, had a population of 4,232; Litchfield, 7,330; Nokomis, 2,476; and Witt, 1,101.

Climate[2]

Montgomery County has a continental climate typical of the central part of Illinois. The temperature varies greatly throughout the year. It often drops to below zero in win-

[1] Others who contributed to the fieldwork are J. D. HARROLD, E. G. HOLHUBNER, I. H. JORGENSEN, E. E. KUBALEK, C. C. MILES, W. D. NETTLETON, E. L. READLE, R. REHNER, and J. F. STEINKAMP.

[2] WILLIAM L. DENMARK, Weather Bureau climatologist for Illinois, Environmental Science Services Administration, U.S. Dept. of Commerce, cooperated in writing this section.

TABLE 1.—*Precipitation and temperature at Hillsboro, Ill.*

[From records kept at the Hillsboro Weather Station from 1902 through 1962]

Month	Precipitation							Temperature					
	Average total	Greatest amount recorded	Least amount recorded	1 year in 10 will have— More than—	1 year in 10 will have— Less than—	Average snowfall	Greatest amount recorded	Average daily maximum	Average daily minimum	Record highest	Record lowest	Average number of days with— Maximum of 90° F.	Average number of days with— Minimum of 32° F.
	In.	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*°F.*	*°F.*	*°F.*	*°F.*		
January	2.4	8.7	0.1	6.1	0.6	4.0	16.0	39	22	75	−21	0	27
February	2.1	6.3	.1	3.8	.8	4.3	22.0	43	24	79	−22	0	22
March	3.3	9.3	(1)	6.5	1.0	3.1	22.7	54	33	90	−10	0	19
April	3.9	9.8	.7	7.0	1.8	.2	2.0	66	43	91	18	0	5
May	4.3	12.5	.1	8.8	1.4	.1	5.0	76	53	98	28	1	(2)
June	4.3	12.1	.2	6.8	1.1	0	0	85	62	106	37	10	0
July	3.3	11.0	.3	6.2	1.0	0	0	90	65	114	45	14	0
August	3.6	13.1	.4	6.1	.7	0	0	88	64	112	42	12	0
September	3.4	9.1	.1	6.8	.8	0	0	82	56	105	27	6	0
October	3.2	9.7	.1	5.9	.7	(1)	1.8	70	45	95	17	1	4
November	2.6	7.1	.1	4.5	.8	.9	10.9	54	34	83	−5	0	15
December	2.2	5.7	.1	3.5	.7	3.7	18.0	42	25	73	−16	0	25
Year	38.6	52.9	26.0	47.0	29.6	16.3	55.0	66	44	114	−22	43	117

[1] Trace.
[2] Less than one-half day.

ter and rises to 100° F. or higher in summer. Low-pressure areas, or storm centers, and their associated weather fronts bring frequent changes in temperature, humidity, amount of cloudiness, and wind direction during much of the year. These changes are less frequent in summer than in winter.

Table 1 gives the average monthly and yearly temperatures and precipitation at Hillsboro, as well as the probabilities of receiving specified amounts of precipitation 1 year in 10. Table 2 gives figures that indicate, for the period March 1 through November 21, the chances of receiving specified amounts of precipitation during 1–week and 2–week periods.

The average annual precipitation is slightly more than 38 inches, but it has been as little as 26 inches in some years and as much as 52.9 inches in others. Only four times during the 20 years from 1944–63 has the amount of precipitation in 1 year been less than 30 inches. About 55 percent of the annual precipitation falls during the growing season, which extends from mid-April through September. The average amount of precipitation in May and in June is greater than that received in any of the other months, or about 4 inches per month. The average amount of precipitation received in each of the months of December, January, and February is less than that received in any of the other months, or slightly more than 2 inches per month.

Data from the Springfield weather station in Sangamon County (about 18 miles north of the north end of Montgomery County) were used by Barger, Shaw, and Dale (*3*)[3] for analyzing the probabilities of receiving specified amounts of precipitation during the periods shown in table 2. As shown in table 2, the chances of receiving 0.4 inch, 1.0 inch, and 2.0 inches of precipitation for periods of 1 week and for periods of 2 weeks vary somewhat throughout the year but are greater in spring and summer than in winter and fall.

The information in table 2 should apply to much of Montgomery County, though there are some local variations. The probabilities listed should be used only to show the seasonal pattern of expected amounts of rainfall. A probability that contrasts with those of immediately adjacent periods is likely to be unreliable for planning a specific operation.

In July and August, the average precipitation is about 3½ inches per month (see table 1). This is only about 60 percent of the total amount of moisture that is used by a vigorously growing field crop, lost through evaporation, and lost through other causes. Therefore, in most years the moisture received from precipitation during fall through the following winter and spring must be stored in the subsoil if crops are to grow well. Major droughts are infrequent, but rather prolonged dry periods during part of the growing season are not unusual. These dry periods can result in a reduction in yields of such summer crops as corn and soybeans.

Precipitation in summer occurs mostly as showers of brief duration or as brief thunderstorms. A single thunderstorm often produces more than an inch of rain and is occasionally accompanied by hail and damaging winds. More than 6 inches of rain has fallen within a 24-hour period. Thunderstorms occur on about 50 days each year; less than half occur during the critical growing period.

Hail is most likely to damage growing crops during the months of June, July, and August. Hail-producing thunderstorms, in the same locality, average less than one per year during the summer months (*10*). In not all hailstorms are the stones of sufficient size or quantity to cause extensive damage to crops.

Only light snow occurs in most winters, and the average total snowfall received each year is about 16 inches. The

[3] Italic numbers in parentheses refer to Literature Cited, p. 91.

TABLE 2.—*Chances of receiving a specified amount of precipitation during a specified period in Montgomery County, Ill.*

[Data from records kept at Springfield, Ill., in Sangamon County]

Period	During a 1-week period				During a 2-week period		
	Trace or less	0.4 inch or more	1 inch or more	2 inches or more	Trace or less	1 inch or more	2 inches or more
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
March 1–7	9	42	14	2	2	51	20
March 8–14	6	56	28	9			
March 15–21	11	59	25	5	0	60	25
March 22–28	8	59	28	8			
March 29–April 4	8	53	27	9	2	65	32
April 5–11	2	66	35	12			
April 12–18	6	55	25	7	0	59	28
April 19–25	9	64	32	9			
April 26–May 2	9	64	31	8	0	64	29
May 3–9	8	54	27	9			
May 10–16	8	58	32	12	0	64	35
May 17–23	11	59	34	14			
May 24–30	4	61	33	13	0	66	37
May 31–June 6	8	61	35	14			
June 7–13	9	66	38	14	2	64	34
June 14–20	19	51	27	10			
June 21–27	4	63	37	16	0	64	35
June 28–July 4	15	54	29	10			
July 5–11	19	52	30	12	2	55	27
July 12–18	17	47	24	8			
July 19–25	22	45	22	7	4	43	19
July 26–August 1	20	39	19	7			
August 2–8	17	52	27	10	4	54	28
August 9–15	11	55	29	10			
August 16–22	13	51	26	9	4	48	20
August 23–29	19	43	17	4			
August 30–September 5	19	46	26	10	4	51	27
September 6–12	13	58	29	9			
September 13–19	24	49	24	7	2	50	23
September 20–26	11	52	26	9			
September 27–October 3	24	50	31	14	8	56	30
October 4–10	17	49	25	9			
October 11–17	22	44	17	4	9	40	16
October 18–24	30	40	19	6			
October 25–31	17	43	18	4	6	43	18
November 1–7	22	44	22	7			
November 8–14	20	43	19	5	6	38	15
November 15–21	20	39	16	4			

total depth of snow received in 1 year has been as little as 2 inches, however, and as much as 50 inches.

Winter months are the cloudiest, with only about 50 percent of the possible amount of sunshine. By July the amount of sunshine has increased, and it is about 75 percent of the possible amount during July and August.

As indicated in table 1, summers are warm in Montgomery County, and continuous warm periods are often prolonged. During the summer, invasions of cool air from the north often fail to penetrate as far south as this county. July is normally the warmest month; in that month the average maximum temperature is near 90° F. Temperatures higher than 100° F. have occurred in June, July, August, and September.

January is normally the coldest month; the average temperature for that month is below freezing. Though some days in February are as cold as those in January, the cold spells are generally shorter. Temperatures of less than 20 degrees below zero have been recorded both in January and February.

In Montgomery County the number of days between the average date of the last freezing temperature in spring and the first freezing temperature in fall is 175 to 180 days. This period is called the growing season, but because crops differ in their tolerance of cold temperatures, the term is somewhat misleading. Table 3 indicates the probability of occurrence of several different threshold temperatures that could be damaging to crops.

Agriculture

Farming has always been the most important enterprise in Montgomery County. In 1964, 88 percent of the total acreage in the county, or 397,573 acres, was land in farms. Much of the acreage is used to grow grain crops. The growing of grain crops is especially extensive on the dark-colored soils in the northern part of the county.

Corn is the crop grown the most extensively. In 1964, 28.6 percent of the total acreage in farms was used to grow corn for all purposes. The acreage in soybeans is also ex-

TABLE 3.—*Probability of freezing temperatures in spring and in fall (13)*

[All freeze data are based on temperatures recorded in a standard U.S. Weather Bureau thermometer shelter at a height approximately 5 feet above the ground and in a representative location. At times the temperature is colder nearer the ground or in local areas subject to extreme air drainage]

Probability	Dates for given probability and temperature				
	32° F.	28° F.	24° F.	20° F.	16° F.
Last in spring:					
Average date	April 22	April 5	March 23	March 10	March 2
25 percent chance after	May 1	April 14	April 1	March 19	March 11
10 percent chance after	May 9	April 22	April 9	March 27	March 19
First in fall:					
Average date	October 17	October 29	November 10	November 20	November 30
25 percent chance before	October 8	October 20	November 1	November 11	November 21
10 percent chance before	October 1	October 13	October 25	November 4	November 14

tensive. In 1964, soybeans were grown on 24.7 percent of the total acreage in farms. Oats are no longer an important crop, though they formerly were grown on a large acreage. The acreage in hay crops, which were also formerly grown extensively, has declined in recent years. In 1964, only 3.9 percent of the total acreage in farms was used to grow alfalfa and other hay crops. The acreage in pastures has also declined. Pastures occupied 16.8 percent of the total acreage in farms in 1964.

Much of the decline in the acreage in oats, hay, and pasture has apparently been caused by increased production of soybeans and by the decrease in the number of horses and mules in the county. In 1960, over 864 horses and mules were in the county. Most of the horses are kept for pleasure rather than for furnishing power on farms.

The raising of hogs is the largest livestock enterprise in the county. In 1964, a total of 152,016 head of hogs and pigs was reported on farms. The number of milk cows has decreased during the past few years, and only 4,572 milk cows were reported on farms in 1964. The number of other cattle, however, rose from 19,991 to 38,845 during the period 1950 to 1964. A total of 5,664 sheep was in the county in 1964, as compared to 18,026 in 1930 and 8,037 in 1959. In the same year, the total number of chickens 4 months old and older was 175,008, as compared to 257,539 in 1959 and 333,864 in 1930.

Transportation and Industrial Development

Several railroads pass through this county. The first, built in 1855, passed through Litchfield, Butler, Hillsboro, and Nokomis and permitted increased exports of grain and livestock to St. Louis and to Terre Haute, Ind. Later it encouraged the development of coal mining and manufacturing. A network of paved primary highways and of improved secondary roads provides access to all parts of the county throughout the year.

In this county coal mining is second only to farming in importance. The first coal mine was developed at Litchfield between 1867 and 1874. The production of coal increased rapidly until World War I, and it is still an important industry.

Manufacturing is concentrated primarily in Litchfield, where such items as shoes, radiators, and milk products are manufactured. Several mutual insurance companies have home offices in Hillsboro.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Montgomery County, where they are located, and how they can be used most effectively. They went into the area knowing they likely would find many soils they had already seen, and perhaps some they had not. As they worked in the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this survey efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Virden and Cowden, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Shiloh silty clay loam and Shiloh silt loam are examples of two soil types. Shiloh silt loam has a profile like that of Shiloh silty clay loam, except that it has been covered during floods by a layer of silt loam.

Some soil types vary so much in slope, degree of erosion, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Harrison silt loam, 0 to 2 percent slopes, is one of several phases of Harrison silt loam, a soil type that ranges from nearly level to sloping. One soil type, Shiloh silty clay loam, has a recent deposit of silt loam over its normal surface layer of silty clay loam. This soil has been named Shiloh silt loam, overwash.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show streams, woodlands, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this survey was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed and so small in size that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Cisne-Huey complex. Also, in some places two or more soils are mapped in a single unit, if the differences between the soils are too small to justify separation, though these soils occur separately. This unit is called an undifferentiated soil group or undifferentiated unit. An example of such a unit is Hickory and Negley loams, 15 to 35 percent slopes. Furthermore, on most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they are not classified in a soil series. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Gullied land, and are called land types.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in soil surveys. On the basis of yield and practice tables and other data, the soil scientists set up trial groups, and then test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Montgomery County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, drainage, and other characteristics that affect management.

The nine soil associations in Montgomery County are described in the following pages. They are shown on the colored map at the back of this soil survey.

1. Virden-Herrick Association

Dark-colored, poorly drained and somewhat poorly drained soils on upland flats

This soil association consists of nearly level, dark-colored soils on a loess-covered drift plain. The soils are naturally poorly drained or somewhat poorly drained. Their drainage has been improved enough, however, that good crops are produced. The association occupies about 20 percent of the county.

About 50 percent of this association consists of poorly drained Virden soils, and about 45 percent consists of somewhat poorly drained Herrick soils on upland flats. The Virden soils generally have a surface layer of black silty clay loam and a subsoil of gray silty clay loam. The Herrick soils have a surface layer of black or very dark gray silt loam and a subsoil of silty clay loam.

Poorly drained Harvel, Ebbert, and Piasa soils, and moderately well drained Harrison soils, occupy about 5 percent of this association. The Harvel soils, in low areas, have a profile similar to that of the Virden soils, except that their surface layer is underlain by a layer of silt loam. The Ebbert soils have a profile similar to that of the Herrick soils, but they are more poorly drained than the Herrick soils and generally have a more grayish subsurface layer. The Piasa soils occur in a few small areas with the Herrick soils but are lighter colored than those soils. The Harrison soils are on knolls and ridges.

All of the soils except the Piasa have moderate to moderately slow permeability, are fertile, and have high available moisture capacity. The Piasa soils contain a large amount of exchangeable sodium (slickspots), have very slow permeability, and have moderate available moisture capacity. They are less suitable for the crops commonly grown in the county than the other soils of this association.

Almost all of this association is used for corn, soybeans, wheat, oats, and meadow. Corn and soybeans are the crops grown the most extensively.

2. Herrick-Harrison Association

Level to sloping, dark-colored, somewhat poorly drained to moderately well drained soils

This soil association is in the northwestern and north-central parts of the county in areas where streams are slightly entrenched in the loess-covered glacial till plain. It occupies about 4 percent of the county.

Herrick soils occupy about 50 percent of the association, and Harrison soils, about 40 percent (fig. 2). Both the Herrick and Harrison soils have a surface layer of dark-colored silt loam and a subsoil of silty clay loam. The Herrick soils have a grayish subsoil that is mottled with brown or yellowish brown. Their drainage needs to be improved if open ditches and tile drains have not already been installed. The Harrison soils commonly have a brown subsoil, which normally indicates good drainage. In most places they need some protection from water erosion. The soils of both series have high available moisture capacity and are well suited to the crops commonly grown. Permeability is moderately slow or moderate.

Virden, Ebbert, Piasa, and Velma soils occupy about 10 percent of this association. These soils, except for the Velma, are level or nearly level. The Velma soils are sloping and are adjacent to the larger streams.

If the soils of this association are properly managed, they are well suited to the crops commonly grown in the county. Corn and soybeans are the crops grown most extensively. Wheat, oats, clover, and alfalfa are grown to a lesser extent.

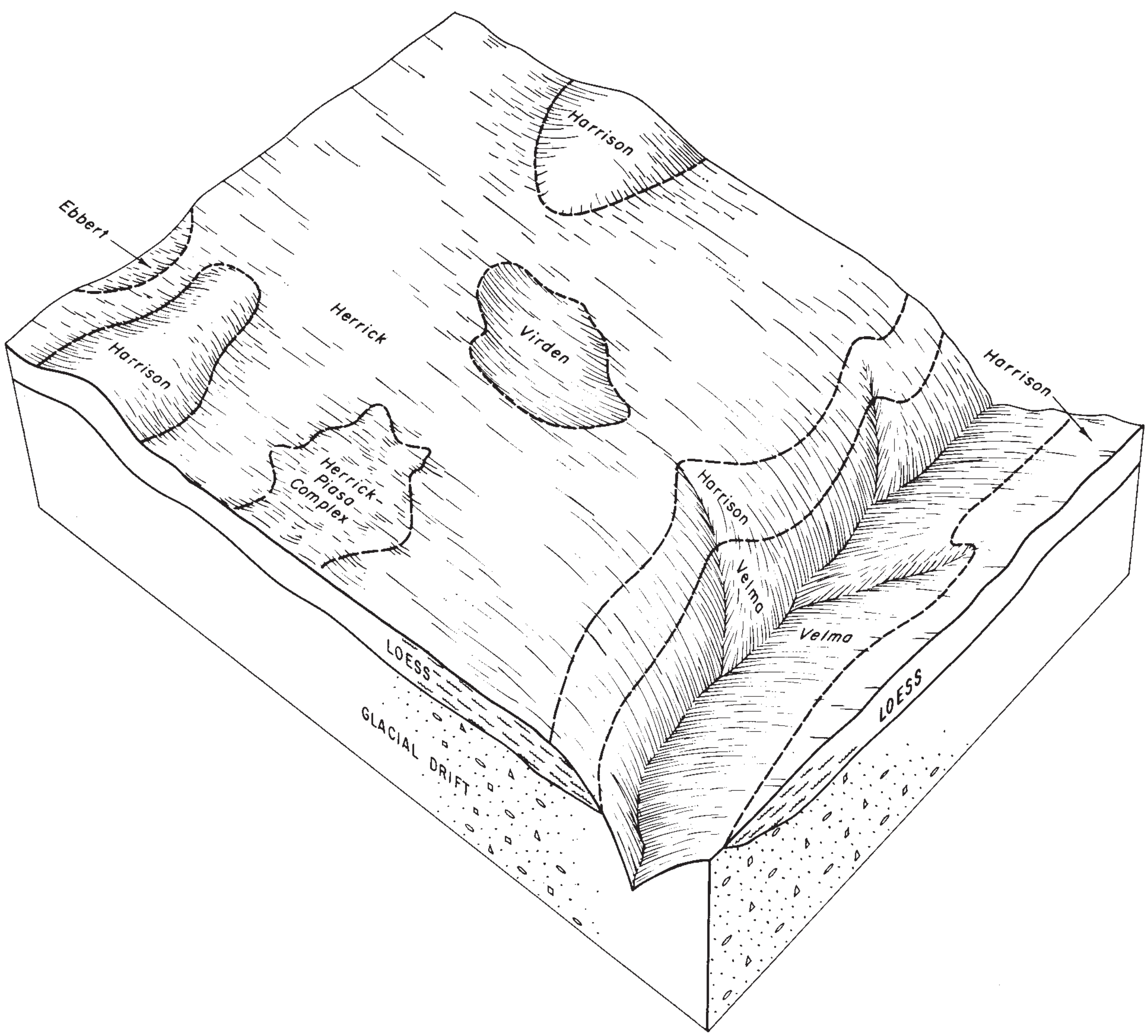

***Figure 2.*—Principal soils of association 2 and their relationship to one another.**

3. Oconee-Douglas-Pana Association

Strongly sloping to gently sloping, dark colored and moderately dark colored, well-drained and somewhat poorly drained soils on ridges and knolls

This soil association consists of rolling areas of loess-covered glacial moraines. It is mainly in the eastern part of the county, but one area is in the central part, near the town of Butler. Strongly sloping or moderately sloping, dark-colored Douglas and Pana soils are at the highest elevations on the tops of the ridges and on the upper side slopes (fig. 3); gently sloping, moderately dark colored Oconee, Tamalco, and Chauncey soils are on the lower side slopes; and areas of nearly level Cowden, Ebbert, and Shiloh soils are between the ridges and knolls. The Shiloh soils are in depressions formerly occupied by shallow lakes. The association occupies about 4 percent of the county.

Oconee soils occupy about 60 percent of this association. They have a surface layer of very dark gray to dark grayish-brown silt loam and a subsurface layer of grayish-brown silt loam. An abrupt boundary separates the subsurface layer from a slowly permeable subsoil of mottled heavy silty clay loam.

Douglas soils occupy about 15 percent of the association, and Pana soils, about 3 percent. The Douglas and Pana soils have a dark-brown or very dark grayish-brown surface layer and a brown subsoil. The Douglas soils, however, developed in loess and have a surface layer of silt loam and a subsoil of silty clay loam. The Pana soils, developed in glacial drift, contain some gravel, and have a surface layer of loam and a subsoil of clay loam. Both the Douglas and Pana soils are well drained, but the Douglas soils have moderate permeability and the Pana soils have moderately rapid permeability.

Minor soils—the Tamalco, Cowden, and Shiloh—occupy much of the remaining acreage in the association, but Chauncey and Ebbert soils occupy small acreages. The Tamalco soils have a profile somewhat similar to that of the Oconee soils, but their subsoil is alkaline in the lower part and contains a large amount of exchangeable sodium. The Cowden soils have a moderately dark colored surface layer and a slowly permeable subsoil of grayish silty clay loam. The Shiloh soils have a surface layer of very dark

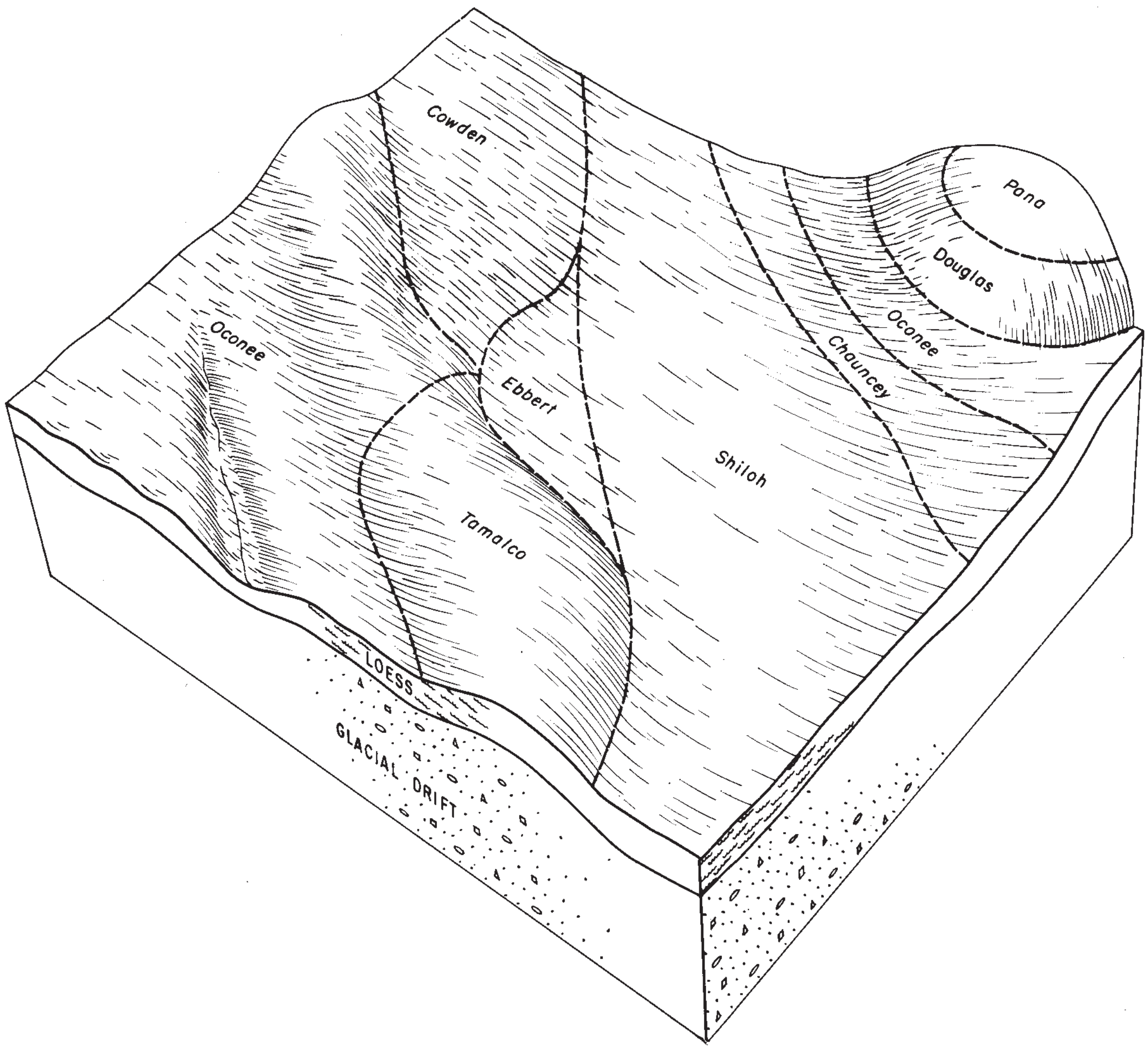

Figure 3.—**Principal soils of association 3 and their relationship to one another.**

294-384—69——2

grayish-brown silt loam or black heavy silty clay loam and a subsoil of black or very dark gray silty clay loam to silty clay. They have naturally poor drainage, but drainage has been improved.

General farming and dairy farming are predominant, and corn, soybeans, wheat, clover, alfalfa, and bluegrass pasture are the principal crops. Erosion is a hazard throughout most of the association, but terraces and grassed waterways are used to help to protect the soils. Also, crops are rotated and the soils are generally farmed on the contour.

4. Herrick-Piasa Association

Level, dark colored and moderately dark colored soils that are on upland divides and that have a moderately slowly or very slowly permeable subsoil

This soil association is on broad upland divides that are mainly level or nearly level but that contain a few depressions. It occupies about 15 percent of the county.

Intermingled areas of Herrick and Piasa soils make up about 80 percent of the acreage in the association. The Herrick soils have a dark-colored surface layer, and the Piasa soils have a moderately dark colored one. Because of this difference in color, the intricate pattern in which these soils occur can be easily seen in plowed fields after heavy rains in spring. Both the Herrick and Piasa soils have developed in loess and have a subsoil of silty clay loam. Unlike the Herrick soils, however, the Piasa soils have an alkaline subsoil that is high in content of exchangeable sodium. Their subsoil is much less permeable and nearer the surface than the subsoil of the Herrick soils. The unfavorable characteristics of their subsoil make the Piasa soils not so well suited to crops as the Herrick. Crops grown on Piasa soils are affected by drought and by deficiencies in minerals to a greater degree than are those grown on the Herrick soils.

Minor acreages in this association are occupied by Harison, Virden, Cowden, Oconee, and Ebbert soils. The Harison andVirden soils are dark colored, and the other soils are moderately dark colored.

Natural drainage is poor or somewhat poor, but it has been improved by installing surface ditches and by installing tile drains in places. In some areas, however, excess moisture remains a hazard to growing crops. The Piasa soils often remain wet in spring long after better drained soils are dry enough to be planted to crops. Very few tile drains have been installed in Piasa soils because water moves too slowly through the profile.

Corn, soybeans, and wheat are the principal crops. Minor acreages are in alfalfa, red clover, and bluegrass pasture.

5. Cowden-Piasa Association

Level, moderately dark colored soils that have a slowly or very slowly permeable subsoil

This soil association is mainly on broad flats in the central and southern parts of the county. It occupies about 14 percent of the total acreage in the county.

Intermingled areas of Cowden and Piasa soils occupy about 50 percent of the association, and Cowden soils that are not intermingled with Piasa soils occupy about 20 percent. The Cowden soils are distinctly different from the Piasa soils in some ways, though they are intermingled with those soils. The main difference is that the Cowden soils have an acid subsoil, and the Piasa soils have an alkaline subsoil that is high in content of exchangeable sodium.

Intermingled areas of Oconee and Tamalco soils, and Oconee soils that are not intermingled with Tamalco soils, occupy about 20 percent of the association. Virden and Ebbert soils also occupy minor acreages. The Oconee and Tamalco soils are gently sloping, and the Virden and Ebbert are mainly nearly level. In some places the Virden and Ebbert soils are in depressions.

Wetness is a hazard, especially in spring. Because the subsoil is slowly or very slowly permeable, tile drains are rarely installed and surface ditches provide most of the supplemental drainage. Corn, soybeans, and wheat are grown on practically all of the acreage, though the soils are only moderately well suited to those crops. The soils are generally so wet that corn and soybeans cannot be planted before late in May or early in June, and the crops do not do so well as those planted earlier.

6. Cisne-Hoyleton-Huey Association

Level to gently sloping, light-colored to moderately dark colored soils that have a slowly permeable or very slowly permeable subsoil

This soil association occupies only about 2 percent of the county and is mainly in the southeastern part. About 30 percent of it consists of intermingled areas of Cisne and Huey soils, about 25 percent consists of Cisne soils that are not intermingled with Huey soils, and another 25 percent consists of Hoyleton soils.

The Cisne and Huey soils are nearly level, and the Hoyleton soils are gently sloping. The Cisne soils have a moderately dark colored surface layer, a grayish subsurface layer, and a very slowly permeable subsoil. The Hoyleton soils are somewhat similar to the Cisne but are better drained and have a more brownish profile. The Huey soils have a light-colored surface layer and lack the thick subsurface layer that is typical in the Cisne profile, or they have only a thin subsurface layer. Unlike the Cisne soils, they have an alkaline subsoil that is high in content of exchangeable sodium. The Huey soils are poorly drained, but improvements in drainage are restricted to surface ditches because permeability is slow in the subsoil.

A minor acreage in this association is occupied by Tamalco soils, which are gently sloping or sloping. These soils have a profile similar to that of the Hoyleton soils, but the lower part of their subsoil is alkaline and is high in exchangeable sodium. Douglas soils occupy a small acreage on high ridges, and Ebbert and Virden soils occupy small areas in low spots. Also in small areas are Cowden and Piasa soils.

The soils of this association are not so well suited to crops as are the nearly level soils in other parts of the county. Most of the acreage is in cash-grain farms, but there are a few general farms and dairy farms. Soybeans and wheat are the principal crops, but corn and alfalfa are grown to some extent.

7. Oconee-Velma-Tamalco Association

Nearly level to strongly sloping, moderately dark colored soils that have a slowly permeable, moderately permeable, or very slowly permeable subsoil

This soil association occupies part of the rolling glacial drift plain in the central part of the county and is also in areas where streams are slightly entrenched in the glacial till plain. It occupies about 8 percent of the county.

Oconee soils occupy about 50 percent of the association; Velma soils, about 20 percent; and Tamalco soils, another 20 percent. The Oconee and Tamalco soils, which developed in loess, are nearly level or gently sloping. The Velma soils, which developed primarily in glacial drift, have stronger slopes. They occur in areas adjacent to streams.

The Oconee soils have a moderately dark colored surface layer and a grayish-brown subsurface layer. Their subsoil is mottled grayish or brownish silty clay loam to silty clay. The Velma soils that are not eroded have a dark-colored surface layer. Their subsoil is brown clay loam. Tamalco soils have a surface layer that is similar to that of the Oconee soils, but they have only a thin, or practically no, subsurface layer. The upper part of the Tamalco subsoil is brown or reddish brown, and the lower part is gray mottled with brown. The lower part is alkaline and is high in exchangeable sodium.

Small acreages in this association are occupied by Cowden and Piasa soils. Another minor acreage is occupied by Douglas soils.

Cash-grain farms, general farms, and dairy farms are predominant in this association. The principal crops are corn, soybeans, wheat, and alfalfa, but some of the more rolling areas are used for pasture. Erosion is a serious hazard in most places. If further erosion takes place, the consequences would be serious because the plow layer would then consist of material from the subsoil, and the subsoil is not suitable for crops. Water generally does not stand on these soils, but tillage is delayed after heavy rains because the soils dry slowly.

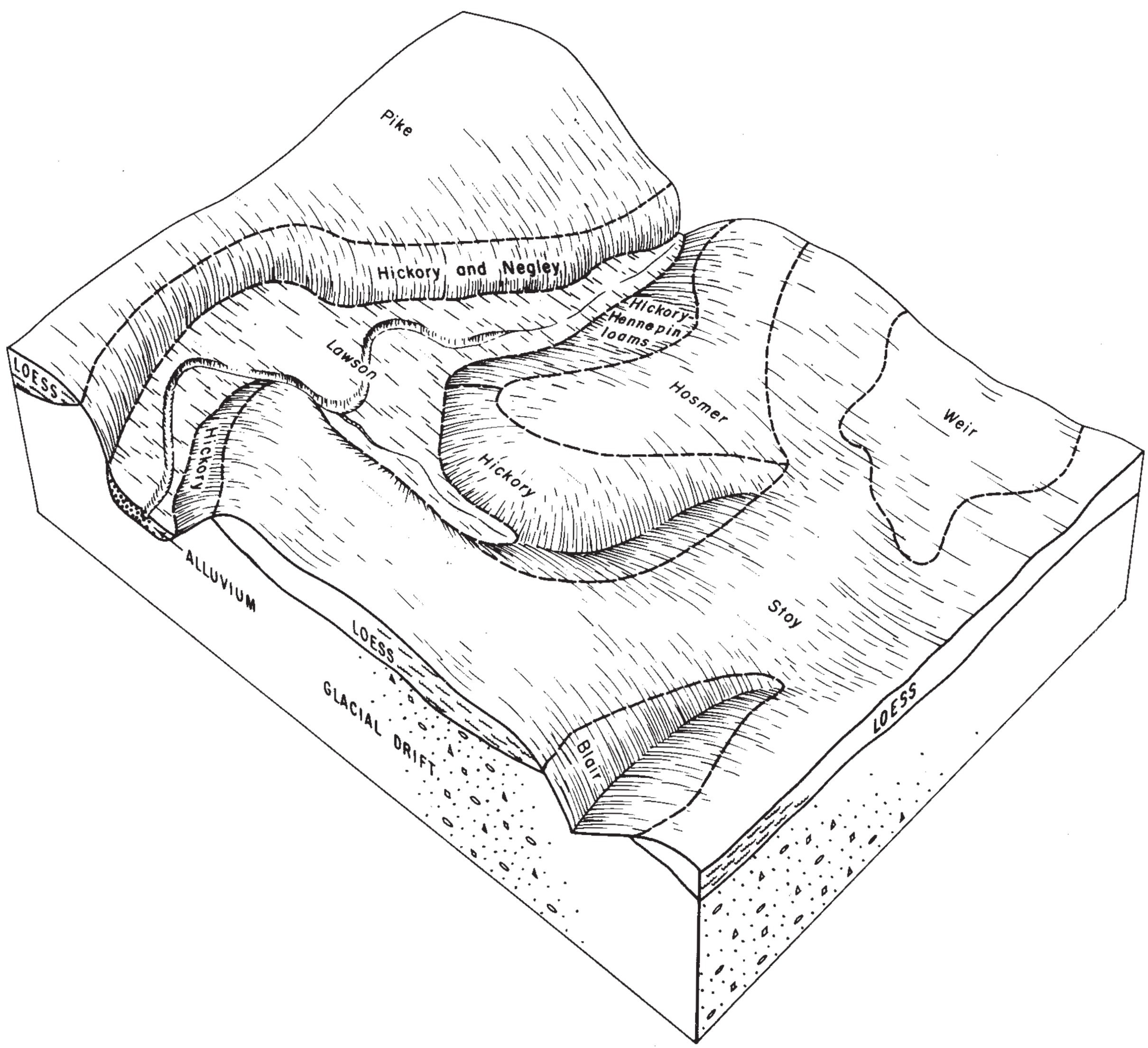

***Figure 4.*—Principal soils of association 8 and their relationship to one another.**

8. Hickory-Hosmer Association

Gently sloping to very steep, light-colored, moderately well drained and well drained soils on uplands adjacent to streams

This soil association is mainly on uplands adjacent to the larger creeks in the central and southern parts of the county. It occupies about 26 percent of the county and consists primarily of narrow ridges occupied by Hosmer soils, and of steeper Hickory soils on the side slopes (fig. 4).

Hickory soils occupy about 30 percent of the association, and Hosmer soils, about 20 percent. The Hickory soils have developed in glacial till and are well drained. They generally have a surface layer of light-colored loam and a subsoil of brownish clay loam. The Hosmer soils have developed in loess and are moderately well drained. They have a surface layer of light-colored silt loam, underlain by a brownish subsoil. The lower part of the subsoil is mottled and contains a fragipan.

Stoy soils occupy about 15 percent of this association, and Weir, Negley, Pike, Hennepin, and Lawson soils together occupy about 35 percent. The Stoy soils are nearly level and are somewhat poorly drained. The Weir soils, on broad flats, are poorly drained. They have a grayish surface layer and a mottled, very slowly permeable subsoil. The Negley soils are steep and are on valley walls in areas of gravelly drift. The Pike soils lie above the Negley soils and in other rolling areas, and the Hennepin soils occur mainly on the lower parts of steep slopes. Lawson soils occur in many valleys of small streams.

General farming is predominant in this association. Throughout much of the acreage, the soils are so sloping and susceptible to erosion that they are not suitable for general farm crops and are used for pasture, as woodland, or as recreational areas (fig. 5). The soils are less suitable for crops than the soils of other associations, are less intensively farmed, and generally produce a lower average per acre income. Also, the farms and fields are normally smaller. The principal crops are corn, soybeans, wheat, and clover.

Many areas of this soil association have potential for use for parks, hunting preserves, or camping areas, and as sites for other kinds of recreation. Many good sites are available for developing into artificial lakes.

***Figure 5.*—Typical area of association 8. Some parts of this association are suitable for parks and other recreational uses.**

9. Lawson-Radford Association

Level, dark-colored, somewhat poorly drained soils on flood plains

This soil association consists of soils on flood plains of the larger streams. It occupies about 7 percent of the county.

Lawson soils make up about 75 percent of the association, and Radford soils, about 10 percent. The Lawson soils are dark colored and are medium textured throughout. They are somewhat poorly drained and are subject to flooding but are suited to the crops commonly grown in the county, especially corn. The Radford soils consist of moderately dark colored, silty, recent sediment over a layer of dark-colored silty clay loam.

Starks, Camden, Terril, Nokomis, Landes, Racoon, and Colo soils occupy about 10 percent of this association. The Starks, Camden, Nokomis, and Terril soils are not subject to flooding. They are mainly on terraces or on alluvial fans, mostly in areas where the smaller streams enter the valleys of larger streams. The Starks and Camden soils have developed in older alluvium than the soils on flood plains, and they have a finer textured and better defined subsoil. The Starks soils are somewhat poorly drained, and the Camden soils are well drained.

The Nokomis soils are darker and have been weathered to a greater extent than the Lawson soils and are more acid than those soils. They are similar to the Terril and Racoon soils but are not well drained like the Terril soils. They are darker colored and better drained than the Racoon soils.

Most of this association is used to grow corn and soybeans. Winter wheat and clover are grown on some of the higher areas but are not grown extensively on the low areas, because of the hazard of flooding. The soils of flood plains are generally part of a farm that also contains the soils of the adjacent uplands. Where the soils are protected from flooding, additional drainage can be provided by installing tile drains. If the soils have been protected from flooding and have had tile drains installed, they are among the best soils for crops in this county.

Descriptions of the Soils

This section describes the soil series and mapping units of Montgomery County. The acreage and proportionate extent of each mapping unit are given in table 4.

The procedure is first to describe the soil series, and then the mapping units in that series. Thus, to get full information on any one mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs. As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Gullied land, for example, is a miscellaneous land type that does not belong to a soil series. It is listed, nevertheless, in alphabetic order along with the soil series.

In comparing a mapping unit with a soil series, many will prefer to read the short description in paragraph form. It precedes the technical description that identifies layers by A, B, and C horizons and depth ranges. The technical profile descriptions are mainly for soil scientists and others

TABLE 4.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Blair silt loam, 5 to 9 percent slopes, eroded	2, 526	0. 5
Blair soils, 5 to 9 percent slopes, severely eroded	511	. 1
Camden silt loam, 2 to 4 percent slopes	249	(1)
Camden silt loam, 4 to 7 percent slopes, eroded	417	(1)
Chauncey silt loam	1, 794	. 4
Cisne silt loam	2, 610	. 6
Cisne-Huey complex	2, 992	. 7
Clarksdale silt loam	1, 410	. 3
Colo silty clay loam	269	(1)
Cowden silt loam	14, 149	3. 1
Cowden-Piasa complex, 0 to 2 percent slopes	31, 337	6. 9
Cowden-Piasa complex, 2 to 4 percent slopes, eroded	954	. 2
Douglas silt loam, 2 to 4 percent slopes	837	. 2
Douglas silt loam, 4 to 7 percent slopes	1, 310	. 3
Douglas silt loam, 4 to 7 percent slopes, eroded	581	. 1
Douglas silt loam, 7 to 12 percent slopes	389	(1)
Ebbert silt loam	6, 542	1. 4
Gullied land	107	(1)
Harrison silt loam, 0 to 2 percent slopes	973	. 2
Harrison silt loam, 2 to 4 percent slopes	12, 645	2. 8
Harrison silt loam, 2 to 4 percent slopes, eroded	542	. 1
Harrison silt loam, 4 to 7 percent slopes	681	. 1
Harrison silt loam, 4 to 7 percent slopes, eroded	881	. 2
Harvel silty clay loam	1, 315	. 3
Herrick silt loam	51, 830	11. 5
Herrick-Piasa complex	50, 012	11. 1
Hickory loam, 7 to 12 percent slopes	1, 153	. 3
Hickory loam, 7 to 12 percent slopes, eroded	3, 971	. 9
Hickory soils, 7 to 12 percent slopes, severely eroded	1, 199	. 3
Hickory loam, 12 to 18 percent slopes	2, 691	. 6
Hickory loam, 12 to 18 percent slopes, eroded	4, 275	. 9
Hickory soils, 12 to 25 percent slopes, severely eroded	1, 741	. 4
Hickory loam, 18 to 30 percent slopes	15, 202	3. 4
Hickory loam, 30 to 60 percent slopes	2, 726	. 6
Hickory-Hennepin loams, 18 to 30 percent slopes	5, 433	1. 2
Hickory-Hennepin loams, 30 to 60 percent slopes	1, 707	. 4
Hickory and Negley loams, 15 to 35 percent slopes	1, 037	. 2
Hosmer silt loam, 2 to 4 percent slopes	11, 134	2. 5
Hosmer silt loam, 4 to 7 percent slopes	2, 662	. 6
Hosmer silt loam, 4 to 7 percent slopes, eroded	5, 005	1. 1
Hosmer soils, 4 to 7 percent slopes, severely eroded	674	. 1
Hosmer silt loam, 7 to 12 percent slopes, eroded	1, 743	. 4
Hosmer soils, 7 to 12 percent slopes, severely eroded	480	. 1
Hoyleton silt loam, 0 to 2 percent slopes	1, 577	. 4
Hoyleton silt loam, 2 to 5 percent slopes	2, 984	. 7
Hoyleton silt loam, 2 to 5 percent slopes, eroded	390	(1)
Hoyleton-Tamalco complex, 1 to 4 percent slopes	703	0. 1
Ipava silt loam	1, 249	. 3
Landes fine sandy loam	114	(1)
Lawson silt loam	24, 330	5. 4
Nokomis silt loam	595	. 1
Oconee silt loam, 0 to 2 percent slopes	9, 071	2. 0
Oconee silt loam, 2 to 4 percent slopes	21, 791	4. 8
Oconee silt loam, 2 to 4 percent slopes, eroded	2, 177	. 5
Oconee silt loam, 4 to 7 percent slopes	2, 017	. 4
Oconee silt loam, 4 to 7 percent slopes, eroded	5, 528	1. 2
Oconee-Tamalco complex, 0 to 2 percent slopes	3, 593	. 8
Oconee-Tamalco complex, 2 to 4 percent slopes	12, 976	2. 9
Oconee-Tamalco complex, 2 to 4 percent slopes, eroded	3, 551	. 8
Oconee-Tamalco complex, 4 to 7 percent slopes, eroded	2, 634	. 6
O'Fallon silt loam, 2 to 4 percent slopes	493	. 1
Pana loam, 4 to 7 percent slopes, eroded	212	(1)
Pana loam, 7 to 14 percent slopes, eroded	386	(1)
Pike silt loam, 0 to 2 percent slopes	147	(1)
Pike silt loam, 2 to 4 percent slopes	1, 640	. 4
Pike silt loam, 4 to 7 percent slopes	1, 050	. 2
Pike silt loam, 4 to 7 percent slopes, eroded	934	. 2
Pike silt loam, 7 to 12 percent slopes, eroded	837	. 2
Racoon silt loam	537	. 1
Radford silt loam	2, 634	. 6
Shiloh silty clay loam	778	. 2
Shiloh silt loam, overwash	222	(1)
Sicily silt loam, 2 to 4 percent slopes	2, 594	. 6
Sicily silt loam, 4 to 7 percent slopes, eroded	915	. 2
Starks silt loam	558	. 1
Stoy silt loam, 0 to 2 percent slopes	7, 282	1. 6
Stoy silt loam, 2 to 4 percent slopes	11, 145	2. 5
Tamalco silt loam, 2 to 4 percent slopes	4, 166	. 9
Tamalco silt loam, 2 to 4 percent slopes, eroded	1, 387	. 3
Tamalco silt loam, 4 to 7 percent slopes, eroded	472	. 1
Terril loam, 2 to 5 percent slopes	445	(1)
Velma loam, 4 to 7 percent slopes	1, 099	. 2
Velma loam, 4 to 7 percent slopes, eroded	4, 151	. 9
Velma loam, 7 to 12 percent slopes	1, 040	. 2
Velma loam, 7 to 12 percent slopes, eroded	2, 069	. 5
Velma loam, 12 to 18 percent slopes	715	. 2
Velma-Walshville complex, 4 to 7 percent slopes, eroded	1, 903	. 4
Velma-Walshville complex, 7 to 12 percent slopes, eroded	731	. 2
Virden silty clay loam	51, 988	11. 5
Weir silt loam	2, 531	. 6
Water	311	(1)
Quarry, gravel pits, borrow pits, mine dumps, and made land	492	. 1
Total	451, 840	100. 0

[1] Less than 0.1 percent.

who want detailed information about soils. Unless otherwise indicated, the colors given in the descriptions are those of a moist soil. Some of the terms used to describe the soils are defined in the Glossary at the back of this soil survey.

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the management group and woodland group in which the mapping unit has been placed. The pages on which each management group and woodland group are described can be found by referring to the "Guide to Mapping Units" at the back of this survey.

Blair Series

Deep, light-colored, sloping to rolling soils that developed in glacial till in the forested areas of the county are in the Blair series. These soils are in the upper parts of the valleys of small streams in the uplands. They receive extra water that seeps from higher areas of adjacent soils and are often slow to dry out after rainy periods.

In most places the surface layer is about 7 inches thick, It consists of dark grayish-brown silt loam that has granular structure and is strongly acid to medium acid. The subsoil, about 30 inches thick, is mainly grayish-brown heavy clay loam or silty clay loam that is mottled with yellowish brown, has subangular blocky structure, and is very strongly acid or strongly acid. The underlying material is gray clay loam mottled with strong brown. It is massive and is slightly acid to neutral in reaction.

Blair soils have moderately slow or slow permeability and moderate to high available moisture capacity. They are low in content of organic matter, nitrogen, phosphorus, and potassium. Except in areas where lime has been added, the surface layer is strongly acid. All of these soils are eroded, and further erosion is a serious hazard.

Representative profile of a Blair silt loam (300 feet north and 50 feet west of the center of sec. 2, T. 7 N., R. 4 W.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist, sticky and plastic when wet; strongly acid to medium acid; abrupt, smooth boundary.

B1—7 to 9 inches, brown (10YR 5/3) gritty light silty clay loam; common, fine, distinct, dark-brown to brown (7.5YR 4/4) mottles; moderate, fine, subangular blocky structure; firm when moist, sticky and plastic when wet; very strongly acid; clear, smooth boundary.

B21t—9 to 13 inches, grayish-brown (10YR 5/2) heavy clay loam; few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; strong, fine, subangular blocky structure; when dry, most peds coated with light-gray (10YR 7/1) silt grains; firm when moist, sticky and very plastic when wet; very strongly acid; clear, smooth boundary.

B22t—13 to 28 inches, grayish-brown (2.5Y 5/2) gritty silty clay loam; few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; strong, medium, blocky structure; has continuous dark grayish-brown (10YR 4/2) clay films on the larger peds and grayish-brown (10YR 5/2) clay films on the smaller peds; firm when moist, sticky and very plastic when wet; very strongly acid; gradual, smooth boundary.

B3t—28 to 37 inches, gray (10YR 5/1) heavy clay loam; many, fine to coarse, prominent, yellowish-brown (10YR 5/4) to strong-brown (7.5YR 5/8) mottles; weak, coarse, blocky structure; firm when moist, sticky and very plastic when wet; contains some large areas of iron and manganese accumulation that have a black (5YR 2/1) center surrounded by yellowish-red (5YR 4/8) and strong-brown (7.5YR 5/8) material; strongly acid; gradual, smooth boundary.

C—37 to 110 inches, mixed gray (10YR 5/1) and strong-brown (7.5YR 5/8) clay loam; few, fine, prominent, black (10YR 2/1) mottles; massive; firm when moist, sticky and plastic when wet; slightly acid to neutral in reaction.

On the upper parts of the slopes, where the Blair soils grade to Stoy soils and other soils developed in loess, some loess is mixed with the weathered till in the A horizon. The surface layer of a typical Blair soil contains enough sand to give it a gritty feel.

Blair soils occur with Hickory, Hosmer, and Stoy soils. They have a grayish-brown subsoil, rather than a brown subsoil like the Hickory soils. Unlike the Hosmer and Stoy soils, they have gritty and gravelly material in all horizons.

Blair silt loam, 5 to 9 percent slopes, eroded (5C2).—This soil has the profile described as representative for the series. Included in mapping, however, were small areas in which the present plow layer consists of material from the subsoil. Also included were some areas in which the surface layer is thicker than the one in the profile described, and other small areas in which the profile is similar to that of the Walshville soils. The included soils are of too limited extent and occur in too irregular a pattern to be shown separately on the soil map. They are not so well suited to crops as the typical Blair soil and are more difficult to manage.

Unless terraces are installed and tillage is done on the contour to reduce losses from erosion, this Blair soil is better suited to hay crops and pasture than to cultivated crops. Even where terracing and contour tillage are practiced, a cropping system in which grasses and legumes are grown at least half the time is needed to help control erosion. Crop residue, left on the surface, also provides protection. If this soil is well managed and is fertilized, it is moderately well suited to corn, soybeans, and wheat. (Management group IIIe-1, woodland group 3)

Blair soils, 5 to 9 percent slopes, severely eroded (5C3).—The plow layer of this soil consists mainly of brown material from the subsoil. It has a texture of silty clay loam to silt loam and is sticky and plastic when wet. The plow layer is lower in content of organic matter, is in poorer tilth, and is harder to till than the original one. Just beneath it is a layer of heavy clay loam. Losses of soil material from the surface layer, and the unfavorable characteristics of the present plow layer, have caused the amount of runoff to be greater than on Blair soils that are less eroded.

These soils are poorly suited or only moderately well suited to the crops commonly grown in the county. They are suited mainly to pasture and hay but can be used occasionally for a row crop if terraces are constructed to help control erosion. (Management group IVe-1, woodland group 3)

Camden Series

The soils of the Camden series are well drained, light colored, and gently sloping or sloping. They have developed in silty or loamy alluvial material on stream terraces and alluvial fans in the valleys of the larger streams. The original cover was a forest of hardwoods, but practically all of the acreage has now been cleared and planted to crops.

In most places the surface layer is about 8 inches thick. It consists of brown to dark-brown silt loam that has granular structure and is medium acid. The subsoil, about 32 inches thick, consists of brown to dark-brown silty clay loam that is medium acid to strongly acid. The underlying material is brown, stratified silt loam to loam or clay loam and is medium acid.

Camden soils have high available moisture capacity and moderate permeability. They are generally strongly acid, except in areas where the plow layer has received lime. The content of organic matter, nitrogen, and phosphorus is low, and the content of potassium is medium. Erosion is a hazard if row crops are grown, unless practices are used that protect these soils. At times, some small areas are flooded for short periods when the level of a stream is high.

Representative profile of a Camden silt loam (452 feet east and 168 feet north of the center of sec. 22, T. 8 N., R. 4 W.):

Ap—0 to 8 inches, brown to dark-brown (10YR 4/3) silt loam; moderate, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

B1—8 to 11 inches, brown to dark-brown (7.5YR 4/4) light silty clay loam; strong, fine, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B21—11 to 20 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; strong, fine and medium, subangular to angular blocky structure; firm; thin clay films on the structural aggregates; strongly acid; gradual, smooth boundary.

B22—20 to 29 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin clay films on the structural aggregates; medium acid; gradual, smooth boundary.

B3—29 to 40 inches, brown (7.5YR 5/4) light gritty silty clay loam; weak, coarse, subangular blocky structure; friable to firm; thin clay films on the structural aggregates; medium acid; gradual, smooth boundary.

C—40 to 60 inches, brown (7.5YR 5/4) silt loam, loam, and clay loam in poorly defined strata; friable to firm; medium acid.

In some parts of the county, the profile of these soils contains more sand than the profile described as typical. Also, the A horizon is several inches thicker in some areas.

Camden soils occur with Starks soils but are better drained than those soils.

Camden silt loam, 2 to 4 percent slopes (134B).—This soil has the profile described for the series. It receives runoff carried by small streams from the adjacent uplands, in addition to receiving the normal amount of rainfall. This increased volume of water causes a serious hazard of erosion.

If tillage is on the contour, row crops can be grown 2 years out of 3. Where terraces have been installed, row crops can be grown 3 years out of 4. Adequate fertilization is needed, and well-placed diversion terraces can be used to help control runoff. (Management group IIe–1, woodland group 1)

Camden silt loam, 4 to 7 percent slopes, eroded (134C2).—This soil has a dark yellowish-brown surface layer that is thinner than the one in the profile described for the series. In places the surface layer contains some material from the upper part of the subsoil. In a few other places, all of the plow layer consists of soil material from the upper part of the subsoil. Included in mapping were a few small areas that have short slopes of more than 7 percent.

Practices are needed that help to protect this Camden soil from erosion. Even where terraces have been installed and contour tillage is practiced, a cropping system in which meadow crops are grown at least one-fourth of the time is necessary. Adequate fertilization is also needed. (Management group IIe–2, woodland group 1)

Chauncey Series

In the Chauncey series are moderately dark colored, poorly drained soils that are gently sloping. These soils have developed in loess, under the influence of prairie vegetation. They are generally at the base of rounded morainal knolls in the eastern part of the county.

In most places the surface layer is about 11 inches thick and consists of very dark grayish-brown to very dark gray silt loam that has granular structure. It is slightly acid to neutral in reaction. The subsurface layer, about 25 inches thick, is dark colored (dark gray) in the upper part and light brownish gray in the lower part. It consists of silt loam that has platy structure and is very strongly acid. The subsoil is about 24 inches thick. It is dark-gray to grayish-brown silty clay loam mottled with dark yellowish brown. The subsoil has blocky structure and is strongly acid to slightly acid in reaction. The underlying material is grayish-brown silty clay loam that is massive and is slightly acid to neutral in reaction.

Chauncey soils have slow permeability and slow internal drainage. They receive runoff from adjacent higher lying soils. Water tends to accumulate on the surface, and as a result these soils are wet in spring. The available moisture capacity is high. Except in the lower part of the subsoil, where these soils are slightly acid, they are strongly acid. They are low in content of available phosphorus and potassium and are medium in content of organic matter and nitrogen.

Representative profile of Chauncey silt loam (465 feet north and 78 feet east of the SE. corner of NW40, NE160, sec. 14, T. 8 N., R. 2 W.):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; weak to moderate, fine, granular structure; friable; slightly acid to neutral; abrupt, smooth boundary.

A1—7 to 11 inches, very dark gray (10YR 3/1) silt loam; weak, medium and fine, granular structure; friable; medium acid; clear, smooth boundary.

A21—11 to 22 inches, dark-gray (10YR 4/1) silt loam; some gray (10YR 5/1) mottles and common, fine, faint, very dark grayish-brown (10YR 3/2) mottles; weak, thin, platy structure; friable; very strongly acid; clear, smooth boundary.

A22—22 to 36 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, distinct, very dark grayish-brown (10YR 3/2) mottles; moderate, thin, platy structure; a few dark-gray (10YR 4/1) coatings of organic matter on the structural aggregates; friable; numerous iron concretions; very strongly acid; abrupt, smooth boundary.

B21t—36 to 46 inches, grayish-brown (10YR 5/2) heavy silty clay loam; common, medium, distinct, dark yellowish-brown (10YR 3/4) mottles; weak, coarse, prismatic structure breaking to moderate, medium, angular blocky structure; firm; strongly acid; clear, smooth boundary.

B22t—46 to 54 inches, dark-gray (10YR 4/1) heavy silty clay loam; common, medium, distinct, dark yellowish-brown (10YR 3/4) mottles; weak, coarse, prismatic structure breaking to moderate, medium, angular blocky structure; thick, very dark gray (10YR 3/1) clay films on the structural aggregates; firm; medium acid; clear, smooth boundary.

B3t—54 to 60 inches, gray (10YR 5/1) silty clay loam; many, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, coarse, prismatic structure breaking to weak, coarse and medium, angular blocky structure; dark-gray (10YR 4/1) clay films on the structural aggregates; firm; slightly acid; clear, smooth boundary.

C—60 to 66 inches, grayish-brown (2.5Y 5/2) silty clay loam; many, medium, prominent, yellowish-brown (10YR 5/8) mottles; massive; firm; few very dark gray (10YR 3/1) clay films along cleavage planes; slightly acid to neutral.

The total thickness of the A horizons ranges from 24 inches to 40 inches. Texture of the B horizons ranges to light silty clay in some places.

Chauncey soils occur with Cowden soils. Their profile is similar to that of the Cowden soils, but their A2 horizon is thicker.

Chauncey silt loam (1 to 3 percent slopes) (287).—This is the only Chauncey soil mapped in Montgomery County. Its profile is the one described for the series. The dominant slope is nearly 3 percent. This soil occurs at the base of knolls and ridges. In places it receives soil material from moderately sloping, higher lying soils, and that material is gradually deposited on the surface. Included in mapping were a few areas covered by recent deposits of silt loam washed from the adjacent higher lying soils.

Contour tillage and terracing are needed to help control erosion. Where contour tillage is practiced and the soils are terraced, a cropping system in which meadow crops are grown one-fourth of the time adequately controls erosion. If these practices are not used, growing meadow crops about half of the time keeps losses from erosion low.

This soil is suited to the row crops commonly grown in the county, and it is used mainly for those crops. Fertilizer is needed. (Management group IIIw–1, woodland group 7)

Cisne Series

Soils of the Cisne series are deep, moderately dark colored, and poorly drained. They are nearly level and occur on uplands in the southern part of the county. These soils have developed under the influence of prairie vegetation in loess that is underlain by till of Illinoian age. The subsoil is dense and compact and is commonly called a claypan.

The surface layer is generally about 11 inches thick and consists of very dark grayish-brown silt loam that has granular structure and is medium acid. The subsurface layer, which also has a texture of silt loam, is about 10 inches thick. It is grayish brown in the upper part and light gray in the lower part, has granular structure or is massive, and is strongly acid to medium acid. The subsoil, to a depth of about 60 inches, consists of dark grayish-brown to gray silty clay loam mottled with dark yellowish brown and yellowish brown. It has blocky structure and is medium acid to neutral in reaction.

Cisne soils have slow or very slow permeability and high available moisture capacity. They are moderate to low in content of organic matter, nitrogen, phosphorus, and potassium. Except in areas where lime has been added, the surface layer is medium acid to strongly acid.

Representative profile of a Cisne silt loam (48 feet north and 24 feet east of the SW. corner of NW40, NW160, sec. 16, T. 7 N., R. 2 W.):

A1—0 to 11 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; medium acid; gradual, smooth boundary.

A21—11 to 18 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; strongly acid to medium acid; clear, smooth boundary.

A22—18 to 21 inches, light-gray (10YR 6/1) silt loam; few, fine, prominent, dark yellowish-brown (10YR 4/4) mottles; massive; friable when moist, not sticky and not plastic when wet; strongly acid to medium acid; abrupt, smooth boundary.

B21t—21 to 28 inches, dark grayish-brown (10YR 4/2) silty clay loam to silty clay; many, fine distinct, dark yellowish-brown (10YR 4/4) mottles; weak to moderate, medium and fine, angular blocky structure; dark-gray (10YR 4/1) clay films; firm when moist, very plastic and very sticky when wet; medium acid; gradual, smooth boundary.

B22t—28 to 40 inches, gray (10YR 5/1) silty clay loam; few, fine, prominent, yellowish-brown (10YR 5/8) mottles; weak to moderate, coarse, angular blocky structure; very plastic when wet; neutral in reaction; gradual, smooth boundary.

B3—40 to 60 inches, same as the B22t horizon, except that the texture is light silty clay loam.

In many places the B horizons are more acid than those in the profile described as typical for the series.

Cisne soils occur with Hoyleton and Douglas soils (fig. 6) but are less brownish in the upper part of the subsoil than the Hoyleton soils. They also occur with Huey soils. In areas of Cisne soils adjacent to Huey soils, the reaction in the lower part of the subsoil ranges to neutral. The Cisne soils have colors about intermediate between those of the moderately dark colored Cowden soils and the light-colored Weir soils.

Cisne silt loam (0 to 1 percent slopes) (2).—This soil has the profile described as typical for the Cisne series. It is low in natural fertility but is well suited to corn, soybeans, wheat, and clover if it is properly fertilized. In most years it is too wet for tillage early in spring. Consequently, crops are frequently planted too late to grow well. (Management group IIIw–1, woodland group 7)

Cisne-Huey complex (0 to 1 percent slopes) (991).—This soil complex consists of a moderately dark colored Cisne soil and a light-colored Huey soil. The soils are poorly drained and are nearly level. They are intermingled in such an intricate pattern that it was not practical to separate them on the soil map. The proportions of each soil vary from place to place. Most areas contain about equal parts of Cisne and Huey soils, but the Cisne soil is most extensive in a few places. The soils occur with soils of the Hoyleton-Tamalco complex in the southern part of the county. They resemble the soils of the Cowden-Piasa and Herrick-Piasa complexes, except that they have a lighter colored surface layer. The profile of the Cisne soil is similar to the one described for the Cisne series. A profile similar to that of the Huey soil is described under the Huey series.

Where the soils of this complex have been plowed, the pattern in which they occur can be easily seen after a heavy rain. The Huey soil is readily distinguished by its light-colored surface layer. Also, it has less favorable structure than the Cisne soil, and this structure easily breaks down and allows the surface soil to run together. Then, the surface becomes smooth and compact though the adjacent Cisne soil retains its cloddy form and rough surface.

The Huey soil has a thinner surface layer than the Cisne soil. In places the surface layer of the Huey soil is so thin that a thin slice of the subsoil is deposited on the surface during tillage. A soil that has such a thin surface layer is poorly suited to crops.

The Cisne and Huey soils have slow or very slow permeability. The Cisne soil is medium acid to strongly acid and is low in exchangeable sodium. The Huey soil has a subsoil that is moderately alkaline and is high in exchangeable sodium. Both of these soils have a low content of organic matter, nitrogen, phosphorus, and potassium. Additional improvements in drainage are needed, though surface ditches have already been installed in many places. The soils are suited to corn, soybeans, wheat, and legume-grass mixtures if they are properly drained and fertilized. (Management group IVw–1, woodland group 7)

Clarksdale Series

Soils of the Clarksdale series are moderately dark colored, nearly level, and somewhat poorly drained. They are on uplands in the northern and central parts of the county, where they have developed in loess that is underlain by Illinoian till. The places in which these soils have formed were border areas where forests were encroaching on the original prairie. The original vegetation was a forest of hardwoods or forest vegetation mixed with grasses.

Figure 6.—**A field of Cisne, Hoyleton, and Douglas soils planted to corn. The Cisne and Hoyleton soils are in the foreground, and the Douglas soils are on the morainal knoll in the background.**

In most places the surface layer is about 7 inches thick. It consists of very dark gray to very dark grayish-brown silt loam that has granular structure and is slightly acid to neutral in reaction. The subsurface layer, about 7 inches thick, consists of very dark gray to dark grayish-brown silt loam and generally has weak subangular blocky to platy structure and is strongly acid. The subsoil is about 39 inches thick. The upper part of the subsoil is brown silty clay loam mottled with yellowish brown, and the lower part is olive-gray to gray silty clay loam, also mottled with yellowish brown. The structure of the subsoil is mostly blocky, and the reaction is strongly acid to neutral. The underlying material is nearly massive silty clay loam that is about neutral in reaction.

Clarksdale soils are suited to corn, soybeans, wheat, and other crops commonly grown in the area. They have high available moisture capacity, have moderately slow permeability, and are fertile. Except in areas where the plow layer has received lime, these soils are generally medium acid to strongly acid throughout the solum. Their content of organic matter, nitrogen, phosphorus, and potassium is medium.

Representative profile of Clarksdale silt loam (618 feet south and 255 feet east of the NW. corner of the SW40 of the SW 160, sec. 25, T. 10 N., R. 5 W.) :

Ap—0 to 7 inches, very dark gray (10YR 3/1) to very dark grayish-brown (10YR 3/2) silt loam; weak, medium, granular structure; friable; slightly acid to neutral; abrupt, smooth boundary.

A21—7 to 12 inches, very dark gray (10YR 3/1) to dark gray (10YR 4/1) silt loam; weak, fine, subangular blocky structure; friable; strongly acid; clear, smooth boundary.

A22—12 to 14 inches, dark-gray (10YR 4/1) to dark grayish-brown (10YR 4/2) silt loam; weak, thick, platy structure and weak, very fine, subangular blocky structure; friable; strongly acid; abrupt, smooth boundary.

A2&Bt—14 to 16 inches, brown (10YR 5/3) silty clay loam; few, fine, faint, yellowish-brown (10YR 5/8) mottles; strong, medium and fine, subangular blocky structure; few dark grayish-brown (10YR 4/2) clay films; thick gray silt coatings on the structural aggregates; firm: strongly acid; abrupt, smooth boundary.

B21t—16 to 21 inches, brown (10YR 5/3) heavy silty clay loam; common, faint, yellowish-brown (10YR 5/8) mottles; moderate, fine and medium, prismatic structure breaking to strong, medium and fine, blocky structure; dark-gray (10YR 4/1) to dark grayish-brown (10YR 4/2) clay films; firm; strongly acid; clear, smooth boundary.

B22t—21 to 36 inches, olive-gray (5Y 5/2) heavy silty clay loam; many, medium, prominent, yellowish-brown (10YR 5/4 to 5/8) mottles; strong, medium, prismatic structure breaking to moderate blocky structure; dark-gray (10YR 4/1) to dark grayish-brown (10YR 4/2) clay films; very firm; strongly acid; gradual, smooth boundary.

B31t—36 to 44 inches, gray (5Y 5/1) silty clay loam in upper part and silt loam in lower part; many, prominent, yellowish-brown (10YR 5/4 to 5/8) mottles; moderate, coarse, prismatic structure breaking to weak, coarse, angular blocky structure; very dark gray (10YR 3/1) and black (10YR 2/1) clay films; very firm; slightly acid; clear, smooth boundary.

B32—44 to 55 inches, gray (5Y 5/1) gritty heavy silt loam; many, coarse, prominent, dark-brown to brown (7.5YR 4/4) mottles and common, coarse, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, coarse, prismatic structure; firm when moist; thick, black (10YR 2/1) and dark-gray (10YR 3/1) clay films; neutral; clear, smooth boundary.

C—55 to 65 inches, gray (10YR 5/1) light clay loam containing some pebbles; many, coarse, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, coarse, prismatic structure; firm; thick, black (10YR 2/1) and very dark gray (10YR 3/1) clay films in the cleavage planes; neutral.

The boundary between the A and B horizons is less abrupt in many places than indicated in the profile described as typical. In some places the B horizons are more brownish than those in the profile described. Depth to the underlying Illinoian till ranges from 50 to 70 inches. The Clarksdale soils in this county are slightly better drained than typical for this series.

Because the Clarksdale soils originated in border areas where forest was encroaching on the original prairie, they have characteristics intermediate between those of the Herrick soils, developed under prairie, and the Stoy soils, developed under forest. The Clarksdale soils are lighter colored than the Herrick soils and darker colored than the Stoy.

Clarksdale silt loam (0 to 2 percent slopes) (257).—This is the only Clarksdale soil mapped in this county. Its profile is like the one described for the series, except that in many places the boundary between the subsurface layer and the subsoil is more gradual. Included in mapping were areas in which the reaction in the lower part of the subsoil is alkaline.

Clarksdale silt loam is well suited to corn, soybeans, wheat, and other crops commonly grown in the county. It is used mainly for those crops, but proper fertilization is required if satisfactory returns are to be maintained. Tile drains are also needed in places, though they have already been installed in some areas. A good seedbed is obtained, whether plowing is done in spring or in fall. (Management group I–2, woodland group 3)

Colo Series

In the Colo series are deep, dark-colored, nearly level soils that are poorly drained. These soils have developed in alluvial material that has a texture of silty clay loam. They occur in some of the low areas in the valleys of major streams throughout the county. The Colo soils were originally covered with mixed vegetation consisting of grasses and forest plants.

In most places the surface layer, to a depth of about 9 inches, is very dark grayish-brown silty clay loam that has granular structure and is mildly alkaline. Beneath this is very dark gray or black silty clay loam that extends to a depth of about 58 inches. The underlying material is dark-gray silty clay loam.

Colo soils are moderately permeable and have very high available moisture capacity. They are high in content of organic matter, nitrogen, phosphorus, and potassium and are neutral to alkaline in reaction. Flooding is a hazard. Therefore, these soils are better suited to corn, soybeans, and other crops that mature in fall than to wheat or other crops that are on the soil during winter.

Representative profile of Colo silty clay loam (216 feet west and 312 feet south of the NE. corner of NE40, NW160, sec. 16, T. 7 N., R. 4 W.):

A11—0 to 9 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, medium, granular structure; friable; mildly alkaline; clear, smooth boundary.

A12—9 to 23 inches, very dark gray (10YR 3/1) silty clay loam; moderate, medium, angular blocky structure; firm; neutral; gradual, smooth boundary.

A13—23 to 52 inches, black (10YR 2/1) silty clay loam; moderate, medium, angular blocky structure; firm; neutral; gradual, smooth boundary.

A14—52 to 58 inches, very dark gray (10YR 3/1) silty clay loam; firm; neutral; gradual, smooth boundary.

Cg—58 to 64 inches, dark-gray (10YR 4/1) silty clay loam; firm; neutral.

Colo soils occur with Lawson soils. They are finer textured than the Lawson soils, but their profile resembles that of the Lawson soils in other ways.

Colo silty clay loam (0 to 2 percent slopes) (402).—This is the only Colo soil mapped in Montgomery County. Its profile is the one described as typical for the series.

In many areas of this soil, improvement in drainage is needed. It can be provided by digging open ditches. Tile drains could also be installed if the hazard of flooding were eliminated. (Management group IIw–1, woodland group 7)

Cowden Series

In the Cowden series are deep, moderately dark colored soils that are poorly drained and nearly level. These soils developed in loess under prairie vegetation. They occur in the prairie areas of Montgomery County but especially in the southern and eastern parts.

In most places the surface layer is about 8 inches thick and consists of very dark gray silt loam that has granular structure and is medium acid. The subsurface layer, about 9 inches thick, also has a texture of silt loam and is dark gray in the upper part and grayish brown to gray in the lower part. It has platy to subangular blocky structure and is strongly acid. The subsoil is about 38 inches thick and consists of grayish-brown, olive-gray, and light olive-brown silty clay loam to silty clay, with brownish or olive-gray mottles. It has blocky structure. Reaction is strongly acid in the upper part to neutral in the lower part.

The subsoil is slowly permeable. Therefore, tile drains will not work well enough for installing them to be economically feasible. The available moisture capacity is high, and the content of organic matter, nitrogen, phosphorus, and potassium is medium. Except in areas adjacent to Piasa soils, the reaction is medium acid to very strongly acid. In some areas adjacent to Piasa soils, however, the reaction in the lower part of the subsoil is neutral to alkaline.

Representative profile of Cowden silt loam (438 feet south and 260 feet east of a point in the center of State Highway No. 185 and directly in front (south) of the center of a farmhouse located on the north side of State Highway No. 185 and in the NW10 of the SE40 of the NW160, sec. 28, T. 8 N., R. 3 W.; laboratory data for this profile are given in Soil Survey Investigations Report for Illinois).[4]

[4] UNITED STATES DEPARTMENT OF AGRICULTURE. SOIL SURVEY LABORATORY DATA AND DESCRIPTIONS OF SOME SOILS OF ILLINOIS. Soil Survey Invest. Rpt. Soil Conservation Service in coop. with Ill. Agr. Expt. Sta. [Unpublished manuscript]

Ap—0 to 8 inches, very dark gray (10 YR 3/1) silt loam; weak, coarse, granular structure; friable; medium acid; abrupt, smooth boundary.

A21—8 to 14 inches, dark gray (10YR 4/1) to very dark gray (10YR 3/1) silt loam; many, faint, grayish-brown (10YR 5/2) mottles; moderate to strong, medium, platy structure; friable; common, fine pores; many fine iron concretions; strongly acid; clear, smooth boundary.

A22—14 to 17 inches, grayish-brown (10YR 5/2) to gray (10YR 5/1) silt loam; common, faint, dark-gray (10YR 4/1) and light-gray to gray (10YR 6/1) mottles; weak, medium, platy structure breaking to moderate, very fine, subangular blocky structure; friable; very porous, and pores are fine and tubular; strongly acid; clear, smooth boundary.

A2&Bt—17 to 19 inches, material in the A2 part is grayish-brown (10YR 5/2) silt loam, and that in the Bt part is brown (10YR 5/3) heavy silty clay loam; strong, medium to fine, subangular blocky structure; firm; many iron concretions; very strongly acid; abrupt, smooth boundary.

B2&A2—19 to 21 inches, material in the B2 part is brown (10YR 5/3) heavy silty clay loam, and that in the A2 part is the same, except that it has coatings of gray (10YR 6/1) on the structural peds; strong, medium to fine, subangular blocky and blocky structure; firm; many iron concretions; strongly acid; abrupt, smooth boundary.

B21t—21 to 28 inches, grayish-brown (10YR 5/2) silty clay loam to silty clay; many, fine, prominent, olive-gray (5Y 5/2) mottles and common, fine, distinct, yellowish-brown (10YR 5/6) mottles; strong, medium, prismatic structure breaking to strong, medium and coarse, angular blocky structure; very firm to firm; moderately thick, very dark gray (10YR 3/1) clay films; some black (10YR 2/1) clay films in a few worm channels; common, fine pores; many iron concretions; strongly acid; gradual, smooth boundary.

B22t—28 to 36 inches, olive-gray (5Y 5/2) heavy silty clay loam; many, fine, prominent, yellowish-brown (10YR 5/4) and brownish-yellow (10YR 6/8) mottles; modrate, medium, prismatic structure breaking to moderate, coarse, angular blocky structure; moderately thick, dark-gray (10YR 4/1) clay films and some very dark gray (10YR 3/1) and black (10YR 2/1) clay films on the peds; many fine pores inside the peds; firm to very firm; many iron concretions; medium acid; gradual, wavy boundary.

B31t—36 to 45 inches, light olive-brown (2.5Y 5/4) light silty clay loam; common, coarse, prominent, yellowish-brown (10YR 5/8) mottles and common, medium, faint, olive-gray (5Y 5/2) mottles; weak, coarse, prismatic structure and some weak, coarse, angular blocky structure; firm; dark-gray (10YR 4/1) clay films; many fine pores lined with very dark gray (10YR 3/1) clay films; iron concretions; slightly acid; clear, wavy boundary.

B32t—45 to 57 inches, light olive-brown (2.5Y 5/4) heavy silt loam; many, coarse, prominent, yellowish-brown (10YR 5/8) mottles and common, medium, prominent, olive-gray (5Y 5/2) mottles; massive to weak, coarse, blocky structure; some very dark gray (10YR 3/1) and dark gray (10YR 4/1) clay films on the vertical faces of the peds; iron concretions; slightly acid to neutral.

Some areas of Cowden soils are adjacent to Piasa soils, and in places the Cowden soils are mapped in complexes with Piasa soils. The Cowden soils have a lighter colored surface layer than the Herrick soils, are somewhat darker colored than the Cisne soils, and are more poorly drained than the Oconee soils. They have a thinner A2 horizon than the Chauncey soils.

Cowden silt loam (0 to 1 percent slopes) (112).—This soil has the profile described for the series. It is moderately well suited or well suited to the crops commonly grown in the county if it is well managed, if it dries out enough so that crops can be planted at the proper time, and if wet seasons are not prolonged. The principal crops are corn, soybeans, wheat, and clover.

Erosion is not a hazard, but this soil is seldom plowed in fall. Where plowing is done in fall, the soil becomes compacted during winter and needs to be replowed before planting time in spring. (Management group IIw–2, woodland group 7)

Cowden-Piasa complex, 0 to 2 percent slopes (993A).—The soils of this complex have developed in loess in the central and southern parts of the county. The complex consists of about equal proportions of a moderately dark colored Cowden soil and a light-colored Piasa soil. These soils occur in such an intricate pattern that it was not practical to show the areas separately on the soil map. After a heavy rain, the Piasa soil can be easily distinguished in a plowed field because it has a much lighter colored surface layer than the Cowden soil (fig. 7). Also, its surface layer is smooth and compact, where the surface layer of the Cowden soil is rough and cloddy. The profile of the Cowden soil is like the one described for the Cowden series. A representative profile for the Piasa soil is described under the Piasa series.

Included with these soils in mapping were a few areas of Herrick soils. Those areas were too small to be mapped separately.

The Cowden soil has high available moisture capacity, and the Piasa soil has moderate available moisture capacity. In years when the amount of rainfall is low to moderate, a shortage of moisture severely limits the growth of corn and soybeans on the Piasa soil. Also, the subsoil of the Piasa soil is alkaline in reaction and is high in exchangeable sodium. Therefore, some plant nutrients held in the subsoil are not available to crops. As a result, crops grown on the Piasa soil show nutritional deficiencies sooner and to a greater degree than those grown on the Cowden soil. In many places the boundaries of the Cowden and Piasa soils can be determined by observing differences in the color of the crops grown on them. Both the soils have a low content of nitrogen and phosphorus. The Piasa soil is also low in potassium, but the Cowden soil has a medium

Figure 7.—A field consisting of soils of Cowden-Piasa complex, 0 to 2 percent slopes. The dark-colored areas are the Cowden soil, and the light-colored ones are the Piasa.

content of that element. Permeability of both soils is very slow.

Because tile drains draw too slowly to remove much water, they are not suitable for draining these soils, and ditches are needed. Proper fertilization is also important. If the soils are well managed, they are well suited to corn, soybeans, wheat, alfalfa, and other crops commonly grown in the county. (Management group IIIw–2, woodland group 7)

Cowden-Piasa complex, 2 to 4 percent slopes, eroded (993B2).—This soil complex occurs along shallow, entrenched drainageways in the glacial till plain. The soils are similar to those of Cowden-Piasa complex, 0 to 2 percent slopes, but they are eroded. In places the plow layer is a mixture of material from the original surface layer and the subsoil. In many other places, it consists of clayey, alkaline material from the Piasa subsoil.

Controlling erosion is difficult on these soils, but diversion terraces can be used in places to provide protection. In most areas keeping these soils in meadow a large part of the time reduces damage from erosion. Adequate fertilization is necessary for the satisfactory growth of plants. (Management group IIIw–2, woodland group 7)

Douglas Series

Deep, dark-colored, well-drained soils that are gently sloping to rolling are in the Douglas series. These soils have developed in loess under prairie vegetation. They are on upland knolls and ridges on the glacial till plain.

In most places the surface layer is about 8 inches thick and consists of very dark grayish-brown silt loam that has granular structure and is slightly acid to neutral in reaction. It is underlain by a layer of very dark grayish-brown heavy silt loam, about 3 inches thick, that has granular or subangular blocky structure and is also slightly acid to neutral. The subsoil, about 37 inches thick, is mainly brown to dark-brown silty clay loam that has subangular blocky structure and is medium acid to strongly acid. The underlying material is dark reddish-brown, massive sandy loam and loam.

The Douglas soils are in good tilth and are suited to a number of different crops, including corn, soybeans, wheat, oats, alfalfa, and clover. In most places erosion is a hazard, except in the least sloping areas. Permeability is moderate, and the available moisture capacity is high. Except in areas where the plow layer has received lime, reaction is medium acid to strongly acid throughout the profile. The content of organic matter and nitrogen is high, and the content of phosphorus and potassium is medium.

Representative profile of a Douglas silt loam (150 feet south and 30 feet east of the NW. corner of the SE40, SE160, sec. 22, T. 9 N., R. 2 W.):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; slightly acid to neutral; abrupt, smooth boundary.

A3—8 to 11 inches, very dark grayish-brown (10YR 3/2) heavy silt loam; moderate, fine, granular to very fine, subangular blocky structure; friable; slightly acid to neutral; clear, smooth boundary.

B1—11 to 15 inches, brown to dark-brown (7.5YR 4/4) light silty clay loam; strong, very fine and fine, subangular blocky structure; thick, very dark grayish-brown (10YR 3/2) coatings on the surfaces of the peds, and these tend to mask colors inside the peds; friable; medium acid; gradual, smooth boundary.

B21t—15 to 21 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; fine and very fine, subangular blocky structure; continuous dark-brown (7.5YR 3/2) clay films on the surfaces of the peds; friable to firm; strongly acid to medium acid; gradual, smooth boundary.

B22t—21 to 28 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; fine and medium, subangular blocky structure that has the aggregates arranged in weak prisms; continuous, dark-brown (7.5YR 3/2) clay films on the surfaces of the peds; friable to firm; strongly acid to medium acid; gradual, smooth boundary.

B31—28 to 38 inches, brown to dark-brown (7.5YR 4/4) light silty clay loam; weak, coarse, subangular blocky structure that has the aggregates arranged in weak prisms; most peds covered with thin, dark-brown (7.5YR 3/2) clay films; friable; medium acid; gradual, smooth boundary.

B32—38 to 48 inches, brown to dark-brown (7.5YR 4/4) heavy silt loam; common, fine, faint, brown (7.5YR 5/2) mottles; massive and contains some cracks; friable; medium acid; abrupt, smooth boundary.

IIAb—48 to 56 inches, dark reddish-brown (5YR 3/3) sandy loam; massive; firm; medium acid; gradual, smooth boundary.

IIBb—56 to 70 inches, dark reddish-brown (5YR 3/3) loam; massive; firm; medium acid.

Many coarse pores, 1 to 5 millimeters in diameter, extend from the A3 horizon downward into the B3 horizons. Below a depth of about 50 inches, the texture varies but the soil material is sandy and porous in many places. In a few areas, the texture at that depth is heavy clay loam.

The Douglas soils occur with Pana soils, but the Douglas soils have a more silty texture. They are better drained than the Harrison soils.

Douglas silt loam, 2 to 4 percent slopes (128B).—This soil occupies the less sloping parts of the ridges. It has the profile described for the series.

This soil is suitable for field crops if practices are used that help to control erosion. If tillage is on the contour, row crops can be grown 2 years out of 3. If this soil is terraced, row crops can be grown 3 years out of 4 without serious losses from erosion. (Management group IIe–1, woodland group 7)

Douglas silt loam, 4 to 7 percent slopes (128C).—This is a rolling soil on knolls and ridgetops in the central and eastern parts of the county. It is subject to erosion. Where tillage is on the contour, however, corn and soybeans can be grown 2 years out of 5. Row crops can be grown 2 years out of 4 if this soil is terraced. (Management group IIe–2, woodland group 7)

Douglas silt loam, 4 to 7 percent slopes, eroded (128C2).—This soil is generally on the side slopes of knolls and ridges. Its surface layer is thinner than the one in the profile described for the series. In places the plow layer contains some material from the upper part of the subsoil that has been mixed with the surface soil as the result of erosion and plowing.

Included in mapping were small areas in which the plow layer consists mainly of material from the subsoil. Those areas are less well suited to the crops commonly grown in the county than are the areas of typical Douglas soils.

Where tillage is on the contour, corn and soybeans can be grown 2 years out of 5. If terraces have been installed, row crops can be grown 2 years out of 4 without risk of serious erosion. (Management group IIe–2, woodland group 7)

Douglas silt loam, 7 to 12 percent slopes (128D).—This soil is on the higher parts of morainal knobs and ridges.

In a few places, its surface layer is thinner than the one in the profile described for the series. Erosion is a serious hazard. If corn, soybeans, and other row crops are grown year after year, terraces are needed, or tillage needs to be done on the contour. (Management group IIIe–1, woodland group 7)

Ebbert Series

The Ebbert series consists of deep, moderately dark colored, poorly drained soils that are nearly level and that developed in loess under the influence of prairie vegetation. These soils occur throughout the prairie areas of the county but are most extensive in the central and southern parts. In places they are in depressions, where the slope is less than one-half percent. In many areas in the central and southern parts of the county, these soils occupy entire depressions.

In most places the surface layer is about 8 inches thick. It consists of very dark gray silt loam that has granular or subangular blocky structure and is slightly acid to neutral in reaction. The subsurface layer, about 16 inches thick, is dark-gray silt loam to silty clay loam that has blocky structure and is slightly acid to medium acid in reaction. The subsoil is about 24 inches thick and is very dark gray in the upper part and gray mottled with yellowish brown and strong brown in the lower part. It has a texture of silty clay loam, has blocky structure, and is slightly acid to neutral in reaction. The underlying material is gray silt loam mottled with yellowish brown and strong brown. It is massive and is neutral in reaction.

Permeability is moderately slow or slow, and the available moisture capacity is high. Surface runoff is slow in most areas. The content of organic matter, nitrogen, phosphorus, and potassium is medium.

Representative profile of Ebbert silt loam (30 feet south of the NW. corner of SW40, NW160, sec. 4, T. 12 N., R. 5 W., along the east side of the road):

A1—0 to 8 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, subangular blocky and medium granular structure; friable; slightly acid to neutral; gradual, smooth boundary.

A2—8 to 24 inches, dark-gray (10YR 4/1) silt loam to silty clay loam; many, fine, distinct, dark reddish-brown (5YR 3/2) mottles; moderate, fine and medium, subangular blocky and angular blocky structure; friable; slightly acid to medium acid; gradual, smooth boundary.

B2tg—24 to 36 inches, very dark gray (10YR 3/1) silty clay loam; many, fine, prominent, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/6) mottles; weak, medium, prismatic structure breaking to moderate to strong, medium, angular blocky and subangular blocky structure; many dark-gray (10YR 5/1) clay films; firm; slightly acid; diffuse, smooth boundary.

B3tg—36 to 48 inches, gray to light-gray (10YR 6/1) light silty clay loam; many, medium, prominent, yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/8) mottles; weak, coarse, blocky structure; few dark-gray (10YR 3/1) clay films; firm; many fine pores lined with dark gray (10YR 3/1); neutral; diffuse, smooth boundary.

C—48 to 72 inches +, gray to light-gray (10YR 6/1) silt loam; many, medium, prominent, yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/8) mottles; massive; friable; neutral.

In areas of these soils in the southern part of the county, the layer between a depth of 48 and 72 inches is absent, and the B3tg horizon is underlain by gritty silty clay loam to clay loam till. In some places the texture in the A1 and A2 horizons is heavy silt loam.

In many places in the northern part of the county, Ebbert soils occur in depressions with Virden soils. They have a grayer, more silty surface layer than the Virden soils and have a subsurface layer that is lacking in the Virden soils.

Ebbert silt loam (0 to 1 percent slopes) (48).—This is the only Ebbert soil mapped in this county. Its profile is the one described for the Ebbert series. Included in mapping were a few small areas of Piasa soils.

If this Ebbert soil is drained and properly fertilized, it is suitable for corn, soybeans, wheat, and other crops commonly grown in the county. Drainage can be improved by installing open ditches. Tile drains can also be used, but to be effective, they must be placed at closer intervals than in most soils. (Management group IIw–2, woodland group 7).

Gullied Land

Gullied land (Gu) is a miscellaneous land type consisting of areas cut by gullies that are 3 to 10 feet deep. The gullies range from 6 to 20 feet in top width and cover at least half of the area. The soil material is variable because the gullies expose several soil layers in most places. Most of the material exposed, however, is acid clay loam, calcareous loam, and sandy loam glacial till, but it includes some material that contains excessive sodium.

A cover of grass can be established on this land type by leveling, fertilizing, and seeding, but only small returns can be expected. An alternate treatment is to plant the areas to shrubs and trees to be used for wildlife and as woodland. Because of the variability in depth of the gullies and the characteristics of the material exposed, a specific investigation at each site should be made to determine appropriate uses. For this reason, Gullied land has not been placed in a specific management group or woodland suitability group.

Harrison Series

In the Harrison series are dark-colored, moderately well drained, nearly level to sloping soils that developed in loess over glacial till under prairie vegetation. These soils are on small knolls and ridges, generally near small streams. They occur mainly in the northern and eastern parts of the county.

In most places the surface layer is about 15 inches thick. It consists of very dark gray to very dark grayish-brown silt loam that has granular structure and is slightly acid to neutral in reaction. The subsoil to a depth of about 43 inches is mostly brown or very dark grayish brown in the upper part and light brownish gray in the lower part. It has a texture of heavy silt loam or silty clay loam, generally has blocky or subangular blocky structure, and is medium acid to slightly acid in reaction. Beneath this soil material is grayish-brown gritty silty clay loam that is mottled with yellowish brown and is neutral in reaction.

These soils are moderately permeable and have high available moisture capacity. They are generally medium acid to slightly acid throughout the profile and are medium in content of organic matter, nitrogen, phosphorus, and potassium.

The Harrison soils are used mainly for corn, soybeans, wheat, oats, alfalfa, and other crops commonly grown in this county. Drainage is generally adequate for crops. Nevertheless, improvements in drainage would be beneficial in fields where these soils are farmed with wet soils.

Representative profile of a Harrison silt loam (780 feet south and 40 feet east of the NW. corner of sec. 9, T. 11 N., R. 5 W.):

A1—0 to 15 inches, very dark gray to very dark grayish-brown (10YR 3/1 or 3/2) silt loam; moderate to strong, fine to medium, granular structure; friable; slightly acid to neutral; clear, smooth boundary.

B1—15 to 21 inches, very dark grayish-brown (10YR 3/2) and brown to dark-brown (10YR 4/3) silt loam; strong, medium to fine, granular to subangular blocky structure; friable; medium acid; gradual, smooth boundary.

B21t—21 to 23 inches, brown to dark-brown (10YR 4/3) light silty clay loam; many, medium, distinct, pale-brown (10YR 6/3) mottles; moderate, medium and fine, subangular blocky structure; common, dark-gray (10YR 4/1), thin clay films on the peds; slightly firm; medium acid; gradual, smooth boundary.

B22t—23 to 35 inches, brown to dark-brown (10YR 4/3) silty clay loam; many, medium, distinct, yellowish-red (5YR 4/8) mottles and common, fine, distinct, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; clay films on the peds; slightly firm; medium acid, gradual, smooth boundary.

B31—35 to 43 inches, light brownish-gray (10YR 6/2) heavy silt loam; many, medium, prominent, yellowish-brown (10YR 5/8) mottles; weak, coarse, angular blocky structure; common channels of gray (10YR 5/1); few pebbles; slightly acid; gradual, smooth boundary.

IIB32—43 to 60 inches, grayish-brown (10YR 5/2) gritty silty clay loam, glacial material; many, coarse, distinct, yellowish-brown (10YR 5/8) mottles; some coatings and channel fillings of dark gray (10YR 4/1); neutral.

In many places the IIB32 horizon consists of grayish loess containing coarse, prominent, yellowish-brown to strong-brown mottles. The loess is massive and is neutral to alkaline in reaction.

The Harrison soils occur with Herrick and Velma soils, but they are better drained than the Herrick soils, and unlike the Velma soils, they formed in loess. The Harrison soils are underlain by less permeable material than the Douglas soils, and they are not so well drained as those soils.

Harrison silt loam, 0 to 2 percent slopes (127A).—In most places this soil has the profile described for the series. In the areas southwest of Hillsboro, however, the profile has a more brownish color than typical and resembles the profile of the Douglas soils. In sloping areas the slopes are convex and in those places this soil is at a higher elevation than the adjacent soils. Though the slopes are gentle, drainage is adequate for farming.

This soil is well suited to a number of different crops, but it is used mostly for row crops, mainly corn and soybeans. Erosion is not a hazard, and the only management practices necessary are tilling properly and applying commercial fertilizer and lime. (Management group I–1, woodland group 7)

Harrison silt loam, 2 to 4 percent slopes (127B).—This soil is on slight knolls and in areas adjacent to drainageways. Because of the gentle slopes, erosion is a hazard. The hazard can be reduced by tilling on the contour and using a cropping system that includes grasses and legumes for 2 years out of 5. If this soil is terraced, it can be used more intensively for corn and other row crops than where terraces are lacking. (Management group IIe–1, woodland group 7)

Harrison silt loam, 2 to 4 percent slopes, eroded (127B2).—This soil occurs mainly near the heads of drainageways where erosion has been active. It has lost much of its original surface layer through erosion, and the present surface layer, about 8 inches thick, contains some material from the uppermost horizon in the subsoil. In many places all of the original surface layer has been lost and the present plow layer is brown silty clay loam. Terraces and contour tillage help to prevent even more serious erosion. A cropping system that includes meadow crops grown 2 years out of 5 is also desirable. (Management group IIe–1, woodland group 7)

Harrison silt loam, 4 to 7 percent slopes (127C).—This soil is on knolls and in areas adjacent to drainageways. It has not been seriously eroded in the past, but future erosion is a hazard unless careful management is used. Growing meadow crops is one of the best ways of providing protection from erosion. If terraces have been installed, a suitable cropping system is one in which meadow crops are grown 1 year out of 4. Where this soil is farmed on the contour, a cropping system in which meadow crops are grown 2 years out of 5 is generally adequate for controlling erosion. Where neither terracing nor contour tillage is used, a cropping system in which meadow crops are grown 3 years out of 5 is suitable. (Management group IIe–2, woodland group 7)

Harrison silt loam, 4 to 7 percent slopes, eroded (127C2).—Erosion has removed part of the original surface layer of this soil. In places the plow layer rests directly on the subsoil. In many areas the plow layer contains material from the subsoil that has been mixed into it by plowing.

Because the present surface layer is thinner than the original one and contains only a small amount of nitrogen, crops grown on this soil often turn yellow. Including legumes and other meadow crops regularly in the cropping system helps to provide nitrogen. If terraces have been installed, a suitable cropping system is one in which meadow crops are grown 1 year out of 4. Where this soil is farmed on the contour, a cropping system in which meadow crops are grown 2 years out of 5 is suitable. Where neither terracing nor contour tillage is used, meadow crops are needed at least 3 years out of 5. (Management group IIe–2, woodland group 7)

Harvel Series

The Harvel series consists of dark-colored, poorly drained soils that developed in loess under grass. These soils are in depressions and were naturally very poorly drained before drainage ditches were installed. They are mainly in the northern part of the county but also occur in other parts. The areas are small and generally occur within large areas of Virden soils.

In most places the surface layer is about 10 inches thick. It consists of black silty clay loam that has angular blocky structure and is neutral to alkaline in reaction. Beneath the surface layer is a layer, about 11 inches thick, of dark-gray heavy silt loam that is massive and is mildly alkaline in reaction. The subsoil is about 35 inches thick and consists of dark-gray light silty clay loam that is nearly massive and is neutral in reaction. The underlying material is gray silt loam that is mottled with yellowish brown. It is massive and is moderately alkaline.

Harvel soils have high available moisture capacity and moderate permeability. They have a high content of organic matter and a medium content of nitrogen, phosphorus, and potassium. The reaction is mildly alkaline. Drainage has been improved. It could be further improved by installing additional tile drains in some areas.

Representative profile of Harvel silty clay loam (40 feet east and 20 feet north of the SW. corner of the NW40, NW160, sec. 17, T. 11 N., R. 4 W.):

A1—0 to 10 inches, black (10YR 2/1) silty clay loam; weak, fine, angular blocky structure; firm when moist, very sticky and very plastic when wet; neutral to alkaline; clear, wavy boundary.

A3—10 to 21 inches, dark-gray (10YR 4/1) heavy silt loam; a few, fine, prominent, dark reddish-brown mottles (5YR 3/4) and a few, coarse, prominent, strong-brown (7.5YR 5/6) mottles; massive; friable to firm when moist, slightly sticky and slightly plastic when wet; black (10YR 2/1) coatings in root channels and large pores; mildly alkaline; gradual, smooth boundary.

B2g—21 to 56 inches, dark-gray (5Y 4/1) light silty clay loam or silt loam; common, fine, prominent, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; firm when moist, very sticky and very plastic when wet; about 40 percent of this horizon is composed of krotovinas, about 1 to 1½ inches in diameter and filled with dark-gray (5Y 4/1) heavy silt loam; neutral; gradual, smooth boundary.

Cg—56 to 65 inches, gray to light-gray (5Y 6/1) silt loam; common, fine, prominent, yellowish-brown (10YR 5/6 to 5/8) mottles; massive; friable to firm when moist, slightly sticky and slightly plastic when wet; moderately alkaline.

The A horizons range from 10 to 25 inches in combined thickness. They are thickest in areas where the Harvel soils grade towards Virden soils.

The Harvel soils, unlike the Virden soils, have a subsoil mainly of silt loam.

Harvel silty clay loam (0 to 1 percent slopes) (252).—This is the only Harvel soil mapped in Montgomery County. Its profile is the one described for the series.

Plowing when this soil is wet tends to compact the plow layer and to break down the structure. After the structure is broken down, the plow layer tends to pack and seal over so that air and water cannot enter easily. Where this soil is in poor tilth, grasses and legumes need to be included in the cropping system. Plowing is generally done in fall to avoid tillage when the soil is too wet in spring. Also, mellowing of the plow layer that takes place throughout the winter improves the seedbed.

This soil is well suited to corn, soybeans, and other crops commonly grown in the county, but proper fertilization is needed. Most of the acreage is in corn and soybeans. (Management group IIw–1, woodland group 7)

Hennepin Series

Soils of the Hennepin series are well drained and are steep or very steep. They occupy the lower parts of valley walls, below areas of Hickory soils. Their original cover was a forest of hardwoods. In many places these soils have a darker colored surface layer than the Hennepin soils mapped in other counties. In areas where the surface layer is not seriously eroded, it is moderately dark colored. The material in which these soils developed is loam or sandy loam, calcareous till that was leached and weathered and subsequently was exposed as the result of headwater or streambank erosion. The darkening of the surface layer by accumulated organic matter, and the leaching of free carbonates from the uppermost few inches of soil material, are the only processes of soil development that are apparent in the soil profile.

In most places the surface layer is about 8 inches thick and consists of a very dark grayish-brown loam that has granular structure and is neutral in reaction. The subsoil, about 4 inches thick, is brown to dark-brown loam that has granular structure and is mildly alkaline. The underlying material, to a depth of 60 inches or more, is light yellowish-brown sandy loam that is massive or single grain and is calcareous.

These soils are moderately permeable but have low available moisture capacity. They are low to medium in natural fertility and are neutral to mildly alkaline in reaction.

Hennepin soils are too steep for field crops and are mainly in trees. Because of the alkaline reaction of the subsoil, however, pines do not grow well. The soils are well suited to pasture but are hard to mow and fertilize, because farm implements cannot be operated easily on the steep slopes.

Representative profile of a Hennepin loam (66 feet west of bridge on county road near the SE. corner of sec. 34, T. 8 N., R. 4 W.):

A1—0 to 8 inches, very dark grayish-brown (10YR 3/2) loam; strong, fine and medium, granular structure; friable; few fine pebbles; neutral; abrupt, wavy boundary.

B—8 to 12 inches, brown to dark-brown (10YR 4/3) loam; moderate, medium and coarse, granular structure; friable; few fragments of rock and rounded pebbles; mildly alkaline; clear, smooth boundary.

C—12 to 60 inches, light brownish-gray (10YR 6/2) sandy loam; about 10 percent, by volume, fine gravel; single grain; firm when moist, nonsticky and nonplastic when wet; calcareous.

In a few places, the A horizon is thicker than 8 inches. In other areas this soil is so eroded that calcareous glacial till is exposed.

In this county the Hennepin soils occur with Hickory soils. Because they have the same kinds of slopes as the Hickory soils and occur in only small areas, they are mapped only in complexes with those soils. They lack the brown, leached subsoil that is typical in the profiles of the Hickory and Velma soils.

Herrick Series

Deep, somewhat poorly drained soils that are dark colored and that developed in loess under prairie vegetation are in the Herrick series. These soils are nearly level and occur on the uplands. They are mainly in the northern and central parts of the county but are also extensive in the southwestern part. In the southwestern and central parts of the county, they are intermingled with Piasa soils.

In most places the surface layer is very dark gray to black silt loam that is about 12 inches thick. It has granular to fine subangular blocky structure and is neutral in reaction in the upper part and medium acid in the lower part. The subsurface layer is about 4 inches thick. It is dark gray or very dark gray silt loam that generally has subangular blocky structure and is strongly acid. The subsoil, about 38 inches thick, is dark grayish-brown to dark yellowish-brown and olive-gray silty clay loam mottled with various shades of brown. It has subangular blocky and blocky structure and is strongly acid to neutral in reaction. The underlying material is olive-gray silt loam mottled with various shades of brown to yellowish red. It has prismatic structure or is massive and is slightly acid.

Herrick soils have moderately slow permeability and high available moisture capacity. They have a high content of organic matter and a medium content of phosphorus and potassium. If these soils are properly managed, they are well suited to the crops commonly grown in the county.

Representative profile of Herrick silt loam (510 feet south of center of road and 286 feet west of the NE. corner of the NE40, NW160, sec. 10, T. 10 N., R. 5 W.); laboratory data for this profile are given in Soil Survey Investigations Report for Illinois (see footnote 4, p. 16):

Ap—0 to 7 inches, very dark gray (10YR 3/1) to black (10YR 2/1) silt loam; weak, medium, granular structure; friable; neutral; abrupt, smooth boundary.

A1—7 to 12 inches, black (10YR 2/1) and some very dark gray (10YR 3/1) silt loam; moderate, fine, subangular blocky structure; friable; medium acid; clear, smooth boundary.

A2—12 to 16 inches, dark gray (10YR 4/1) and very dark gray (10YR 3/1) silt loam; weak, medium, platy structure breaking to moderate, very fine, subangular blocky structure; small patches and coatings of blanched silt on the peds, and these coatings are especially apparent when the soil material is dry; friable; strongly acid; clear, smooth boundary.

B1t—16 to 18 inches, dark grayish-brown (10YR 4/2) light silty clay loam; few, fine, faint, yellowish-brown (10YR 5/6) mottles; moderate, fine, subangular blocky and blocky structure; when dry, has thick, grainy coatings of blanched silt on the peds; friable; medium acid; clear, smooth boundary.

B21t—18 to 22 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate to strong, fine and medium, subangular and angular blocky structure; when dry, has thick, light-gray coatings of blanched silt around the peds; firm to friable; medium acid; clear, smooth boundary.

B22t—22 to 29 inches, grayish-brown (2.5YR 5/2) heavy silty clay loam; many, fine, prominent, yellowish-brown (10YR 5/6 to 5/4) mottles; strong, medium and fine, prismatic structure breaking to strong to moderate, medium, angular blocky structure; thick, black (10YR 2/1) and very dark gray (10YR 3/1) clay films; many fine tubular pores lined with clay films; firm; many very dark brown (10YR 2/2 to 3/2) iron concretions; strongly acid; gradual, smooth boundary.

B23t—29 to 40 inches, olive-gray and olive (5Y 5/2 to 5/3) heavy silty clay loam; many, fine, prominent, yellowish-brown (10YR 5/4 to 5/6) mottles; moderate to strong, medium, prismatic structure breaking to moderate to weak, medium and coarse, angular blocky structure; black (10YR 2/1) to very dark gray (10YR 3/1) clay films; firm when moist, sticky and very plastic when wet; medium acid; gradual, smooth boundary.

B24t—40 to 47 inches, olive-gray (5Y 5/2) silty clay loam; many, fine, prominent, yellowish-brown (10YR 5/4 to 5/6) mottles and a few, coarse, prominent, strong-brown (10YR 5/8) mottles; moderate, coarse, prismatic structure; thick, black and very dark gray (10YR 2/1 to 3/1) clay films; firm when moist; slightly acid to neutral; gradual, smooth boundary.

B3t—47 to 54 inches, olive-gray (5Y 5/2) silty clay loam; many, medium, prominent, yellowish-brown (10YR 5/8) mottles and common, coarse, prominent, strong-brown (7.5YR 5/8) mottles; weak, coarse, prismatic structure; firm; very dark gray (10YR 3/1) clay films; neutral; gradual, smooth boundary.

C—54 to 65 inches, olive-gray (5YR 5/2) silt loam; many, coarse, prominent, strong-brown (7.5YR 5/8) and yellowish-red (5YR 5/8) mottles and common, coarse, prominent, dark yellowish-brown (10YR 4/4) mottles; weak, very coarse, prismatic structure to massive; occasional cleavage planes lines with dark-gray (10YR 4/1) clay films; friable to firm; slightly acid.

In many places the upper B horizons are less brownish than those in the profile described. This is generally true of the Herrick soils that are intermingled with Piasa soils. The platy structure described for the A2 horizon is not apparent in all areas.

Herrick soils have a dark-gray subsurface horizon that is lacking in the Ipava and Virden soils. They are more poorly drained than the Harrison soils, and they lack the abrupt change in texture from the subsurface horizon to the subsoil that is typical of the Cowden soils.

Herrick silt loam (46).—This nearly level soil has the profile described for the series. In most places its drainage has been improved by installing tile drains and digging open ditches, but additional improvements in drainage are needed. Tillage is easy, and this soil can be tilled either in fall or in spring. It is well suited to corn, soybeans, wheat, oats, alfalfa, clover, and other crops commonly grown in the county. (Management group I–2, woodland group 7)

Herrick-Piasa complex (995).—This soil complex consists of intermingled areas of a somewhat poorly drained, nearly level Herrick soil and a poorly drained, nearly level Piasa soil. These soils occur in such an intricate pattern that it was not feasible to separate them on the soil map. In many places after a heavy rain, however, the Piasa soil in a recently plowed field can be easily distinguished because its surface layer is lighter colored than that of the Herrick soil. The surface layer of the Piasa soil is also thinner than that of the Herrick soil. In addition, it has weaker structure. As a result, clods tend to slake down, making some areas have a smooth surface that is often called a slickspot. Unlike the Herrick soil and most other soils in the county, the Piasa soil has a subsoil that is alkaline and contains excessive exchangeable sodium. The profile of the Herrick soil is the one described for this series. A typical profile of the Piasa soil is described under the Piasa series.

The soils of this complex are similar to those of the Cowden-Piasa and Cisne-Huey complexes in the pattern in which they occur. Typically, the Herrick and Piasa soils occur in about equal proportions. In some areas, however, mostly in the northern part of the county, the Herrick soil is more extensive than the Piasa. Included with these soils in mapping were areas of Cowden soils that were too small to be mapped separately.

The Herrick soil has high available moisture capacity, but the Piasa soil has only moderate available moisture capacity. Because of the greater amount of moisture it contains, the Herrick soil is better suited to crops than the Piasa, and it also contains more nitrogen, phosphorus, and potassium. Wetness is a hazard where crops are grown on these soils. Tile drains are not effective in removing excess water from the Piasa soil, but open ditches can be used to improve the drainage of that soil. Tile drains could be installed in the areas that consist largely of the Herrick soil and that contain only a moderate acreage of Piasa soil.

The soils of this complex are suited to corn, soybeans, wheat, alfalfa, and clover. They generally dry out so slowly in spring that they are not suitable for oats. Because the reaction of the Piasa soil is alkaline, moderate applications of phosphorus, applied frequently, give better results than large applications. (Management group IIIw–2, woodland group 7)

Hickory Series

In the Hickory series are deep, light-colored, well-drained soils that have developed in loam glacial till of Illinoian age. These soils are rolling to very steep. They occupy valley walls along creeks in the parts of the county that were originally under forest.

In most places the surface layer is about 2 inches thick. It is very dark grayish-brown loam that has granular structure and is slightly acid. The subsurface layer, about 8 inches thick, is strong-brown to brown loam that has subangular blocky structure and is strongly acid. The subsoil is about 32 inches thick and consists mainly of strong-brown to brown clay loam that has subangular blocky structure. It is strongly acid in the upper part and has neutral reaction in the lower part. The underlying material is calcareous brown loam to sandy loam and is massive.

Hickory soils are moderately permeable and have moderate available moisture capacity. Their content of organic matter, nitrogen, and phosphorus is low, and their content of potassium is medium. In most places the reaction is strongly acid, but it is less acid in some places. Because many of the areas are steep and all of these soils are susceptible to erosion, most of the acreage is wooded (fig. 8). Some areas have been cleared and are pastured, however, and a few areas are planted to annual crops.

Representative profile of a Hickory loam (720 feet south and 40 feet east of the NW. corner of NW40, SW160, sec. 6, T. 7 N., R. 2 W.):

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) loam; weak, very fine, granular structure; friable; slightly acid; abrupt, wavy boundary.

A2—2 to 10 inches, strong-brown (7.5YR 5/6) to brown (7.5YR 5/4) loam; massive to weak, fine, subangular blocky structure; friable; small, irregular areas of material similar to that in the A1 horizon are in the upper part of this horizon; strongly acid; gradual, smooth boundary.

B1—10 to 14 inches, strong-brown (7.5YR 5/6) to brown (7.5YR 5/4) heavy loam; weak, medium, subangular blocky structure; friable to firm; strongly acid; gradual, smooth boundary.

B2—14 to 29 inches, strong-brown (7.5YR 5/6) to brown (7.5YR 5/4) clay loam; weak to moderate, fine to

Figure 8.—**Typical area of Hickory soils covered with oak and hickory trees. Hosmer soils are on the ridge in the background.**

medium, subangular blocky structure; brown to dark-brown (7.5YR 4/4) clay films; firm; 5 percent of soil mass, by volume, consists of pebbles ¼ inch to 3 inches in diameter; most of the pebbles are hard and of mixed mineralogy, but some are weathered, are easily fractured, and originated from metamorphic and igneous rocks; strongly acid; gradual, wavy boundary.

B31—29 to 35 inches, strong-brown (7.5YR 5/6) to brown (7.5YR 5/4) heavy loam; common, medium, distinct, pale-brown (10YR 6/3) mottles; weak, coarse, subangular blocky structure; brown to dark-brown (7.5 YR 4/4) clay films; friable to firm; about 5 percent, by volume, is pebbles; strongly acid; gradual, wavy boundary.

B32—35 to 42 inches, strong-brown (7.5YR 5/6) to brown (7.5YR 5/4) loam; many, fine to medium, pale-brown (10YR 6/3) mottles and a few, fine, distinct, light brownish-gray (10YR 6/2) mottles; massive to weak, coarse, subangular blocky structure; a few, brown to dark-brown (7.5YR 4/4) clay films in cracks; friable; neutral; abrupt, irregular boundary.

C—42 to 60 inches +, brown (10YR 5/3) loam to sandy loam; massive; firm and compact; effervesces when dilute hydrochloric acid is added; moderately alkaline.

The combined thickness of the B horizons varies considerably, as does depth to the calcareous C horizon. In some areas of these soils at the top of the slope, the carbonates in the C horizon have been leached to a depth of as much as 80 to 100 inches. In other small areas, depth to the carbonates is only about 20 inches. In many places where the carbonates have been leached to a great depth in the soils at the top of the slope, the soils are yellowish red instead of strong brown and are deeper than these soils in other areas. They consist of a soil that was formerly buried but was subsequently exposed by geologic erosion.

Hickory soils have a more brownish subsoil than the Blair soils, and they have a lighter colored surface layer than the Velma soils. They have a finer texture in the lower horizons than the Negley soils and are more deeply leached than the Hennepin soils.

Hickory loam, 7 to 12 percent slopes (8D).—This soil has the profile described for the series. Included in mapping were small areas of Hosmer soils and other soils that developed in loess on the upper parts of the slopes.

This Hickory soil is suited primarily to meadow or pasture. It can be used occasionally for a row crop, however, if terraces are used to protect it from erosion. (Management group IIIe–1, woodland group 1)

Hickory loam, 7 to 12 percent slopes, eroded (8D2).—In most places erosion has thinned the surface layer of this soil, and the combined thickness of the present surface layer and the subsurface layer is now only 5 to 8 inches. In a few places, the subsoil is exposed. Included with this soil in mapping were small areas of Hosmer soils and of other soils that developed in loess on the upper parts of the slopes.

This Hickory soil is better suited to meadow than to row crops. If it is tilled on the contour or terraced, however, a row crop can be grown occasionally without risk of serious erosion. (Management group IIIe–1, woodland group 1)

Hickory soils, 7 to 12 percent slopes, severely eroded (8D3).—Erosion has removed all or nearly all of the original surface layer of this soil, and the present surface layer is brown loam to clay loam. In places all of the subsoil has been lost and the calcareous underlying material is exposed.

These soils can be used for meadow, and occasionally they can be used for a row crop. More commonly, they are used for pasture or trees. Loss of the original surface layer, which lowers the moisture-supplying capacity, makes these soils only moderately well suited to any of these uses. (Management group IVe–1, woodland group 1)

Hickory loam, 12 to 18 percent slopes (8E).—In places the surface layer of this soil is less acid and is darker and thicker than the one in the profile described for the series. Also, in most places the profile is shallower over calcareous glacial till.

This soil is so steep that it is generally used for pasture and trees. It is suited to meadow, however, and a row crop can be grown occasionally. (Management group IVe–1, woodland group 1)

Hickory loam, 12 to 18 percent slopes, eroded (8E2).—Erosion has made the surface layer of this soil thinner than the one in the profile described for the series. In many small areas, erosion has removed all of the original surface layer and the subsoil is exposed.

This soil is suitable for meadow, and it can be used occasionally for a row crop. More commonly, it is used for pasture or trees. (Management group IVe–1, woodland group 1)

Hickory soils, 12 to 25 percent slopes, severely eroded (8E3).—These soils have lost most of their original surface layer, and the subsoil is exposed in many places. The present surface layer is loam to clay loam. In a few places, all of the subsoil has been lost and the calcareous glacial till is exposed.

These soils can be used for pasture or trees. They are only moderately well suited to pasture, however, because they have lost so much soil material from the surface layer. (Management group VIe–1, woodland group 1)

Hickory loam, 18 to 30 percent slopes (8F).—This soil has a profile that is similar to the one described for the series, except that the surface layer is darker and thicker in some places. Included with it in mapping were small areas in which limestone, sandstone, and shale are near the surface. These areas are mainly east of Litchfield, along the valley of West Fork Shoal Creek.

Nearly all of the acreage is used for pastures or trees. The pastures need to be fertilized, seeded to grasses and legumes, and well managed. (Management group VIe–1, woodland group 1)

Hickory loam, 30 to 60 percent slopes (8G).—In many places the surface layer of this soil is darker, thicker, and less acid than the one in the profile described for the series. In those areas the subsoil is thinner than the one in the profile described for the series and calcareous glacial till is nearer the surface. This soil is shallow over limestone, sandstone, and shale in some places, especially in the areas east of Litchfield, near West Fork Shoal Creek. It is used mainly for producing wood products. (Management group VIIe–1, woodland group 1)

Hickory-Hennepin loams, 18 to 30 percent slopes (997F).—This is a soil complex in which small areas of Hickory and Hennepin soils are so intermingled that showing them separately on the soil map was not feasible. The Hickory soil occupies about 80 percent of the mapped areas. It is on the upper part of the slopes, and the Hennepin soil is mostly on the lower part. In places the Hennepin soil occurs in a discontinuous rather than in a continuous band. The Hennepin soil does not have a leached subsoil like the Hickory soil. The profile of the Hickory soil is the one described for the Hickory series. A profile that is typical for the Hennepin soil is described under the Hennepin series.

Included with these soils in mapping were areas of a soil that lies between the areas of Hickory and Hennepin soils and that has characteristics about half way between those of the Hickory and Hennepin soils. This included soil has a thick surface layer of dark grayish-brown loam and a thin subsoil of brown, leached light clay loam. It is underlain by calcareous sandy loam to loam glacial till that in most places is many feet thick.

Because of the steep slopes and rapid runoff, the soils of this complex are subject to erosion. Nearly all of the acreage is in pasture or trees. The soils are well suited to improved pasture, but good management of the pastures and woodland is needed for satisfactory returns. (Management group VIe–1, woodland group 1)

Hickory-Hennepin loams, 30 to 60 percent slopes (997G).—The Hickory soil is dominant in this complex; about 80 percent of the acreage consists of Hickory loam. Runoff is rapid, and erosion is a hazard. The steep slopes limit the extent to which pastures can be improved and the kinds of management practices that can be applied. In general, these soils are much better suited to trees than to pasture or field crops. (Management group VIIe–1, woodland group 1)

Hickory and Negley loams, 15 to 35 percent slopes (998F).—The soils of this unit are well drained, light colored, and rolling to very steep. They occur in the same general areas, require similar management, and are used in the same ways. Therefore, mapping them separately did not seem practical, and they were mapped together in an undifferentiated unit of Hickory and Negley loams. The Negley soil does not occur in all areas, and in most areas the Hickory soil is the more extensive of the two soils. Both soils have developed under forest and occur in areas adjacent to the larger streams. The Hickory soil has a profile like the one described for the series. The Negley soil has a profile like the one described for the Negley series.

The soils of this unit have moderate available moisture capacity. They are low in content of organic matter, nitrogen, and phosphorus and medium in content of potassium. The Hickory soil is moderately permeable, and the Negley soil is rapidly permeable.

These steep soils are subject to erosion. They are used mainly for trees and pasture. Running farm machinery over them is hazardous because of the danger of overturning. (Management group VIe–1, woodland group 1)

Hosmer Series

Soils that are light colored, moderately well drained, and gently sloping to rolling are in the Hosmer series. These soils are on uplands, generally adjacent to the major streams. They have developed in loess and were originally covered by a forest of mixed hardwoods. A slowly permeable, dense layer, called a fragipan, is in the lower part of their subsoil. Roots do not penetrate this layer, and the soils have no more than a moderately deep effective root zone. The unconsolidated material beneath the fragipan extends to a considerably greater depth, however, than that to which roots can penetrate.

In most forested areas, the surface layer is about 1 inch thick and consists of very dark gray silt loam that has granular structure and is slightly acid. The subsurface layer, about 5 inches thick, is dark grayish-brown silt loam that is massive in the upper part and has subangular blocky structure in the lower part. It is very strongly acid. The upper part of the subsoil extends to a depth of about 28 inches and is very strongly acid to extremely acid. It is brown to dark yellowish-brown and has a texture of silt loam in the upper part and of light silty clay loam in the lower part. The lower part of the subsoil is about 35 inches thick, consists of mottled gray and brown silty clay loam to silt loam, and is extremely acid to strongly acid.

Hosmer soils are slowly permeable and are subject to erosion because of the extensive runoff. They have moderate available moisture capacity and moderate natural fertility. The plow layer is very strongly acid, except in areas where lime has been added. In most places the content of organic matter, nitrogen, and phosphorus is low, and the content of potassium is low to medium.

These soils are fairly well suited to corn, soybeans, wheat, clover, alfalfa, and other crops commonly grown in the county. Control of erosion and proper fertilization are the major management needs.

Representative profile of a Hosmer silt loam in a forested area (490 feet east and 122 feet north of the SW. corner of sec. 13, T. 9 N., R. 5 W.); laboratory data for this profile are given in Soil Survey Investigations Report for Illinois (see footnote 4, p. 16):

O1—dark-brown to black, decomposed leaf litter.

A1—0 to 1 inch, very dark gray (10YR 3/1) silt loam; moderate, fine to medium, granular structure; very friable; slightly acid; clear, smooth boundary.

A2—1 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; massive in upper part, but the structure grades to weak, fine, subangular blocky in the lower part; friable; very strongly acid; clear, smooth boundary.

B1—6 to 11 inches, brown to dark-brown (10YR 4/3) silt loam; weak, fine to medium, subangular blocky structure; friable; very strongly acid; clear, smooth boundary.

B21t—11 to 17 inches, dark yellowish-brown (10YR 4/4) light silty clay loam to silt loam; weak to moderate, medium, subangular blocky structure; friable; distinct, fine patches of dark-brown (10YR 3/3) clay films on the surfaces of the peds and in the ped interiors; very strongly acid; clear, smooth boundary.

B22t—17 to 23 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; moderate, medium, subangular blocky structure breaking to strong, fine, angular blocky structure; thin patches of brown (10YR 5/3) clay films on the surfaces of most peds and in the ped interiors; friable to firm; when dry, contains discontinuous small patches of blanched silt; very strongly acid; clear, smooth boundary.

B23t—23 to 28 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; strong, medium and fine, subangular blocky and angular blocky structure; friable to firm; blanched silt coatings, 1 millimeter thick, are on the peds and form an apparently continuous network throughout the horizon, though they do not completely coat most individual peds; extremely acid; clear, smooth boundary.

A'&B'—28 to 33 inches, light brownish-gray (2.5Y 6/2, moist) and white (10YR 8/1, dry) silt grains, which make up the A' horizon, coat the peds in the B' horizon. The B' horizon is mottled dark yellowish-brown (10YR 4/4) and grayish-brown (10YR 5/2) silty clay loam; strong, fine to medium, blocky structure arranged in moderate, medium prisms; firm; the few ped faces not coated with the gray silt have distinct, dark grayish-brown (10YR 4/2) to dark yellowish-brown (10YR 3/4) clay films; extremely acid; clear, smooth boundary.

B'2t—33 to 41 inches, mottled grayish-brown (10YR 5/2) and brown to dark-brown (7.5YR 4/4) silty clay loam; strong, medium, angular blocky structure, with the aggregates arranged in weak prisms; distinct, dark yellowish-brown (10YR 4/4) to dark grayish-brown (10YR 4/2) clay films on the surfaces of the peds; firm; extremely acid; gradual, smooth boundary.

B'x1—41 to 50 inches, light silty clay loam that is mottled in about equal proportions and in a fine, distinct pattern with gray (10YR 6/1) to grayish brown (2.5Y 5/2) and dark yellowish brown (10YR 4/4) to yellowish brown (10YR 5/4); weak, medium, prismatic structure breaking to weak, medium, angular blocky structure; distinct, nearly continuous, brown or dark-brown (10YR 4/3) to dark yellowish-brown (10YR 3/4) clay films on the surfaces of the peds; spots of blanched silt, 1 to 5 millimeters in diameter, are apparent on the surfaces of the peds and in ped interiors; very firm; extremely acid; clear, smooth boundary.

B'x2—50 to 60 inches, heavy silt loam mottled in about equal proportions and in a fine to medium, distinct pattern with grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/4); weak, coarse and very coarse, prismatic structure; very firm to extremely firm; strongly acid; clear, smooth boundary.

IIB'x3—60 to 68 inches +, dark yellowish-brown (10YR 4/4) gritty silt loam; common, medium, distinct, dark grayish-brown (10YR 4/2) to grayish-brown (10YR 5/2) mottles; massive; extremely firm; very strongly acid to strongly acid.

Where this soil has been plowed, the material in the A1 and A2 horizons is mixed, and the plow layer is dark grayish-brown (10YR 4/2), friable silt loam that has weak, fine, crumb structure. The horizon at a depth of 28 to 33 inches forms a distinct grayish zone in the profile.

Hosmer soils occur with Pike, Stoy, Weir, and Hickory soils. They are not so well drained as the Pike soils but are better drained than the Stoy and Weir. The Hosmer soils developed in loess rather than in glacial till like the Hickory soils. They have a thinner surface layer than the O'Fallon soils and contain a subsurface layer that is lacking in the O'Fallon soils.

Hosmer silt loam, 2 to 4 percent slopes (214B).—This gently sloping soil is mainly on ridges. Its profile is the one described for the series.

This soil is moderately well suited to the crops commonly grown in the county, but it needs proper fertilization. If no erosion control practices are used, meadow crops grown one-third of the time help to protect the soil. Where tillage is on the contour and this soil is terraced, a cropping system in which grain crops are grown more than two-thirds of the time can be used without causing excessive losses from erosion. (Management group IIe–3, woodland group 2)

Hosmer silt loam, 4 to 7 percent slopes (214C).—In most places this sloping soil is adjacent to drainageways. In a few places, however, it is on rounded knolls at a higher elevation than the surrounding soils. In general, the profile is the one described for the series. Included in mapping, however, were a few small areas in which the surface layer is darker than the one in the profile described for the series.

This Hosmer soil is moderately well suited to the crops commonly grown in the county, but it needs to be properly fertilized. Also, where cultivated crops are grown, terracing, contour tillage, or other erosion control practices are needed. Where those practices are used, meadow crops need to be grown one-third of the time in the cropping system. If no practices are used that help to control erosion, a cropping system in which meadow crops are grown three-fifths of the time will generally protect this soil. (Management group IIIe–2, woodland group 2)

Hosmer silt loam, 4 to 7 percent slopes, eroded (214C2).—In most places this soil is adjacent to drainageways, but in a few places it is on rounded knolls at a higher elevation than the surrounding soils. It has a thinner surface layer than the one in the profile described for the series. In some places the plow layer consists of dark grayish-brown silt loam that has small lumps of yellowish-brown soil material from the subsoil mixed into it. In a few areas that are too small to be shown on the soil map, the plow layer consists mainly of material from the subsoil.

Included with this soil in mapping were a few small areas of a soil that has a similar profile but that has a darker colored surface layer. Also included were a few small areas of a less sloping soil.

Even if this Hosmer soil is well fertilized, it is only poorly suited to moderately well suited to crops. If cultivated crops are grown, terracing, tilling on the contour, and other practices that help to control erosion are needed. If those practices are used, a cropping system in which this soil is used for meadow crops one-third of the time is needed to help control erosion. If no erosion control practices are used, growing meadow crops more than half of the time will protect this soil. (Management group IIIe–2, woodland group 2)

Hosmer soils, 4 to 7 percent slopes, severely eroded (214C3).—These soils are generally adjacent to drainageways. They are severely eroded, and the present plow layer is grayish-brown heavy silt loam or light silty clay loam that has much material from the subsoil mixed into it. An abrupt boundary separates the plow layer from the subsoil. In some places the subsoil is like the one in the profile described for the series, but it is thinner in many places and has a dense, compact fragipan nearer the surface. In those areas the available moisture capacity has been seriously reduced. The underlying glacial till is near the surface in many places.

The low content of organic matter and limitations resulting from severe erosion make these soils better suited to pasture or hay than to cultivated crops. Even where the soils are well fertilized and well managed, they are poorly suited to only moderately well suited to the field crops commonly grown in the county. If cultivated crops are grown, erosion control practices that include terracing and contour tillage are necessary. Where those practices are used, a suitable cropping system is one in which these soils are used for meadow three-fifths of the time. (Management group IVe–1, woodland group 2)

Hosmer silt loam, 7 to 12 percent slopes, eroded (214D2).—This rolling soil is adjacent to entrenched drainageways. It has a plow layer of dark grayish-brown to grayish-brown, friable silt loam. Beneath the plow layer is dark grayish-brown material like that in the profile described for the series. In a few places, small lumps of yellowish-brown material from the subsoil are mixed with the other soil material in the plow layer. In some small areas, most of the plow layer consists of material from the subsoil. The underlying glacial till is at a depth of less than 40 inches in places.

This soil is poorly suited to only moderately well suited to the field crops commonly grown in the county, even though it is well fertilized. Where the erosion control practices include terracing and contour tillage, a cropping system in which this soil is used for meadow one-half the time will help to control erosion. If no erosion control practices are used, this soil needs to be kept in pasture or hay. (Management group IIIe–2, woodland group 2)

Hosmer soils, 7 to 12 percent slopes, severely eroded (214D3).—These rolling soils are generally adjacent to entrenched drainageways. Their plow layer has extended into the subsoil and consists of grayish-brown heavy silt loam to light silty clay loam. Because the friable upper part of the subsoil is thinner than the comparable part of the profile described for the series, and the dense, compact fragipan is nearer the surface, the available moisture capacity has been seriously reduced. Generally, glacial till is also near the surface.

These soils are suited to hay and pasture if such practices as terracing and contour tillage are used to help control erosion. Even where the soils are properly fertilized and well managed, however, returns are only low to moderate. These soils are too droughty and susceptible to further erosion to be well suited to the other crops commonly grown in the county. They can be used for trees and are well suited to pines. (Management group IVe–1, woodland group 2)

Hoyleton Series

Deep, moderately dark colored, somewhat poorly drained soils that developed in loess under prairie vegetation make up the Hoyleton series. These soils are nearly level to gently sloping and occur on uplands in the southern part of the county. They have a dense, compact claypan in their subsoil.

In most places the surface layer is about 8 inches thick and consists of very dark grayish-brown silt loam that has granular structure and is strongly acid. The subsurface layer, about 3 inches thick, is mottled dark grayish-brown to brown silt loam that has granular structure and is very strongly acid. The subsoil is about 26 inches thick and consists of silty clay loam to silty clay that has blocky or subangular blocky structure. It is brown, mottled with yellowish red in the upper part and grayish brown to gray in the lower part, and it is extremely acid to strongly acid. The underlying material is gray to light-gray silt loam that is massive and is neutral to moderately alkaline in reaction.

Hoyleton soils are slowly permeable when they are fully moist, and they have high available moisture capacity. The content of organic matter and nitrogen is moderate to low, and the content of available phosphorus and potassium is low. Except where the plow layer has received lime, the surface layer is medium acid to strongly acid. These soils are suited to corn, soybeans, wheat, and other crops commonly grown in the county.

Representative profile of a Hoyleton silt loam (186 feet north and 15 feet east of the SE. corner of NW40, SE160, sec. 2, T. 7 N., R. 2 W.):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable; strongly acid; abrupt, smooth boundary.

A2—8 to 11 inches, dark grayish-brown (10YR 4/2) to brown (10YR 4/3) silt loam; many, fine, faint, dark-brown (10YR 3/3) mottles and a few, fine, distinct, brown to dark-brown (7.5YR 4/4) mottles; weak, fine, granular structure; friable; very strongly acid; abrupt, smooth boundary.

B1t—11 to 14 inches, brown (7.5YR 5/2) light silty clay loam; common, fine, prominent, yellowish-red (5YR 4/6) mottles; strong, fine, subangular blocky structure; when dry, has many thick, white (10YR 8/1) coatings of silty material on the peds; firm; extremely acid; abrupt, smooth boundary.

B21t—14 to 17 inches, grayish-brown (10YR 5/2) silty clay; many, fine, prominent, red (2.5YR 4/6) mottles; strong, fine, angular blocky structure; very firm; extremely acid; gradual, smooth boundary.

B22t—17 to 26 inches, grayish-brown (10YR 5/2) silty clay loam to silty clay; a few, fine, prominent, brown to dark-brown (7.5YR 4/4) mottles and a few, fine, prominent, red (2.5YR 4/6) mottles; coarse, medium, prismatic structure breaking to moderate, medium, angular blocky structure; thick, dark grayish-brown (10YR 4/2) clay films; very firm; very strongly acid; gradual, smooth boundary.

B3t—26 to 37 inches, gray to light-gray (10YR 6/1) heavy silt loam; many, fine, prominent, strong-brown (7.5YR 5/6) mottles; nearly massive, but contains a few large cracks; firm; few dark-gray (10YR 4/1) clay films in the cracks; many, fine, very dark gray (10YR 3/1) veins; few pores lined with dark-gray (10YR 4/1) material; strongly acid; gradual, smooth boundary.

C1—37 to 50 inches, gray to light-gray (10YR 6/1) silt loam; many, medium, prominent, yellowish-brown (10YR 5/6) mottles; massive; firm; many fine, very dark gray (10YR 3/1) veins and dark-gray (10YR 4/1) clay films in a few cracks; neutral; gradual, smooth boundary.

IIC2—50 to 60 inches, gray (10YR 5/1) gritty silt loam; many, medium, prominent, dark yellowish-brown (10YR 4/4) mottles; massive; friable; few fine pebbles; moderately alkaline.

Hoyleton soils occur with Cisne, Huey, and Tamalco soils. They are better drained than the Cisne soils and do not have a mildly alkaline subsoil like the Huey and Tamalco soils. The color of their surface layer is about halfway between that of the surface layer of the Oconee soils and the surface layer of the Stoy soils. Unlike the Oconee soils, they have red mottles in the upper part of the subsoil. Also, they developed in a thinner layer of loess.

Hoyleton silt loam, 0 to 2 percent slopes (3A).—This soil occupies low crowns and is at a slightly higher elevation than the adjacent soils. Its profile is the one described for the Hoyleton series. Water moves slowly through the profile. Therefore, this soil remains too wet for tillage early in spring. No special practices are needed other than proper fertilization and good management. (Management group IIw–2, woodland group 7)

Hoyleton silt loam, 2 to 5 percent slopes (3B).—This soil is gently sloping and needs some protection from erosion. Managing crop residue well and keeping tillage to a minimum help to control erosion. Keeping this soil in meadow 2 years out of 5 also controls erosion satisfactorily if contour tillage is practiced. Where contour tillage is not practiced, a cropping system in which meadow crops are grown half of the time is satisfactory. Terraces provide enough protection so that this soil can be used primarily for row crops. Because water moves slowly through the profile, this soil remains too wet for tillage early in spring. (Management group IIe–4, woodland group 7)

Hoyleton silt loam, 2 to 5 percent slopes, eroded (3B2).—This soil is mainly along drainageways, but it is on small knolls in a few places. Erosion has removed part of the original surface layer. The present plow layer is very dark grayish brown and is thinner than the one in the profile described for the series. It rests directly on the subsoil. In some areas the surface layer is lighter colored than the one in the profile described for the series.

This soil needs protection from further erosion. It will be much more difficult to manage if further erosion is allowed to remove the remaining surface soil, and if the plow layer then consists mainly of material from the subsoil. Managing crop residue well, keeping tillage to a minimum, choosing a suitable cropping system, and using other good management practices will help to control erosion. If no special erosion control practices are used, a cropping system in which meadow crops are grown one-half the time is suitable. Terraces can adequately control erosion, even though this soil is used mainly for row crops. (Management group IIe-4, woodland group 7)

Hoyleton-Tamalco complex, 1 to 4 percent slopes (992B).—This soil complex consists of Hoyleton and Tamalco soils that are intermingled in an intricate pattern. The soils are gently sloping and are on ridges or side slopes along drainageways. They have profiles like the ones described for their respective series. The surface layer of the Tamalco soil is thinner than that of the Hoyleton soil. Included in mapping were some areas that are nearly level.

During periods of dry weather, crops do not grow so well on the Tamalco soil as on the Hoyleton. Because of the slow movement of water through the profile, some areas remain too wet for tillage early in spring, and some areas contain small seepy spots. These soils are only moderately well suited to the crops commonly grown in the county, even though they are well managed and are properly fertilized. Practices are needed that help to control erosion.

Where contour tillage and terracing are practiced, a cropping system in which these soils are kept in meadow about two-fifths of the time controls erosion. If no erosion control practices are used, these soils need to be kept in meadow most of the time and a row crop grown only occasionally. Trees do not make satisfactory growth because of the alkaline reaction of the Tamalco subsoil. (Management group IIIe-3, woodland group 7)

Huey Series

The Huey series consists of light-colored, nearly level soils that are poorly drained and that developed in loess under a cover of grass. These soils are on uplands in the southern part of the county.

In most places the surface layer is about 8 inches thick. It consists of dark-gray silt loam that has platy or granular structure and is slightly acid to neutral in reaction. The subsurface layer, about 2 inches thick, is grayish-brown loam that has platy structure and is medium acid. The subsoil is about 23 inches thick. It consists of gray silty clay loam that has columnar or prismatic structure and is mildly to moderately alkaline. The underlying material is gray heavy silt loam that is massive and is moderately alkaline and high in exchangeable sodium.

These soils have low natural fertility. Their supplies of nitrogen and potassium are especially low, and their subsoil is generally too alkaline for the phosphorus they contain to be available to plants. Available moisture capacity is moderate to low. These soils dry out slowly in spring. When they are fully moist, permeability is very slow. Moderate amounts of phosphorus and potassium, applied frequently, are more suitable for these soils than large amounts applied only occasionally. Open ditches are used to improve drainage, but the planting of crops is often delayed past the optimum period for planting, even where drainage has been improved. If these soils are properly fertilized, they are suited to corn, soybeans, and wheat.

Representative profile of a Huey silt loam (378 feet north and 100 feet west of the SE. corner of NW40, NE160, sec. 17, T. 7 N., R. 2 W.):

Ap—0 to 8 inches, dark-gray (10YR 4/1) silt loam; weak to moderate, medium, platy structure breaking to weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; slightly acid to neutral; abrupt, smooth boundary.

A2—8 to 10 inches, grayish-brown (10YR 5/2) silt loam; moderate, thin, platy structure; friable when moist, nonsticky and very slightly plastic when wet; medium acid; abrupt, wavy boundary.

B21t—10 to 14 inches, gray (10YR 5/1), light-gray (10YR 6/1), and a few areas of dark-gray (10YR 4/1) silty clay loam; common, fine, prominent, yellowish-brown (10YR 5/6) mottles; massive to weak, coarse, columnar structure; sticky and plastic when wet; few chert pebbles; mildly alkaline; gradual, smooth boundary.

B22t—14 to 24 inches, gray (2.5YR 5/1) silty clay loam; few, fine, distinct, strong-brown (7.5YR 5/6) mottles; weak, coarse, prismatic structure; very plastic and very sticky when wet; moderately alkaline; gradual, smooth boundary.

B3t—24 to 33 inches, gray (10YR 5/1) silty clay loam; strong-brown (7.5YR 5/6) mottles; massive; firm; moderately alkaline; gradual, smooth boundary.

C—33 to 45 inches, gray (10YR 5/1) heavy silt loam; strong-brown (7.5YR 5/6) mottles; massive; friable; moderately alkaline.

The A2 horizon is absent in many places. In those areas an abrupt boundary separates the Ap horizon from the B21t horizon.

Huey soils occur with Cisne soils. They have a lighter colored, thinner surface layer than the Cisne soils and have a moderately alkaline subsoil, high in exchangeable sodium, that is lacking in the Cisne soils. The profile of the Huey soils resembles that of the Piasa soils, but the surface layer is lighter colored. In Montgomery County the Huey soils are intermingled in an intricate pattern with the Cisne soils and are mapped with those soils.

Ipava Series

Deep, dark-colored, nearly level soils of the uplands are in the Ipava series. These soils have developed in loess under the influence of prairie vegetation. They are in the extreme northwestern part of the county and in an area north of Butler. Natural drainage is somewhat poor, but response is good if additional drainage is provided.

In most places the surface layer is about 12 inches thick. It consists of black to very dark gray silt loam that has granular structure and is neutral to slightly acid in reaction. The surface layer is underlain by a layer of very dark gray, mottled heavy silt loam that is about 5 inches thick, has granular structure, and is medium acid. The subsoil, about 28 inches thick, is mainly light yellowish-brown silty clay loam that is mottled with yellowish brown or with grayish brown. It has subangular blocky and blocky structure and is medium acid to slightly acid. The underlying material is strong-brown, massive silt loam that is mottled with gray and is slightly acid.

Ipava soils have moderate permeability and high available moisture capacity. They contain a large amount of plant nutrients and are slightly acid to medium acid.

Representative profile of Ipava silt loam (990 feet south and 40 feet west of the NE. corner of sec. 7, T. 12 N., R. 5 W.):

A1—0 to 12 inches, black (10YR 2/1) to very dark gray (10YR 3/1) silt loam; strong, medium, granular structure; friable; slightly acid to neutral; gradual, smooth boundary.

A3—12 to 17 inches, very dark gray (10YR 3/1) heavy silt loam; few, fine, distinct spots of yellowish brown (10YR 5/4); strong, medium, granular structure, friable; medium acid; clear, smooth boundary.

B21t—17 to 24 inches, light yellowish-brown (10YR 6/4) light silty clay loam; common, fine, distinct mottles of yellowish brown (10YR 5/8); moderate, medium, subangular blocky and angular blocky structure; thick, dark-gray (10YR 4/1) coatings on the peds; friable to firm; medium acid; gradual, smooth boundary.

B22t—24 to 34 inches, light yellowish-brown (10YR 6/4) heavy silty clay loam; many, fine, distinct, grayish-brown (10YR 5/2) mottles; strong, medium, subangular blocky and angular blocky structure; dark-gray (10YR 4/1) coatings on the peds; firm; medium acid; gradual, smooth boundary.

B3t—34 to 45 inches, yellowish-brown (10YR 5/4) light silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/8) mottles; weak, medium to coarse, angular blocky and subangular blocky structure; firm; root channels of very dark gray (10YR 3/1); slightly acid; gradual, smooth boundary.

C—45 to 60 inches, gray (10YR 5/1) silt loam; many, medium, prominent, strong-brown (10YR 5/8) mottles and common, medium, prominent, very dark gray (10YR 3/1) mottles; massive but contains a few cracks; friable; slightly acid.

Ipava soils have a darker surface layer than Herrick soils. They also lack the subsurface layer that is typical in the Herrick profile.

Ipava silt loam (43).—This nearly level Ipava soil is the only one mapped in Montgomery County. Its profile is the one described for the series.

Tile drains have been installed in most places, and drainage has been improved to the extent that this soil can usually be tilled as soon after a rainy season as naturally better drained soils. It is well suited to corn and soybeans, and it is used mainly for those crops. Favorable soil tilth is not difficult to maintain, and plowing can be done in fall without danger of serious erosion or of excessive compaction taking place during winter. (Management group I–2, woodland group 7)

Landes Series

Somewhat poorly drained, nearly level, moderately coarse textured soils that formed in alluvium make up the Landes series. These soils occur only in a few areas on the flood plains of the West and Middle Forks of Shoal Creek. Originally, they had a cover of mixed grasses and bottomland hardwoods.

In most places the surface layer is about 10 inches thick. It consists of very dark grayish-brown fine sandy loam that has granular structure and is neutral in reaction. Beneath the surface layer is brown to pale-brown fine sandy loam to loamy fine sand that is mottled with reddish brown and brownish gray to strong brown. It is structureless (single grain) and is slightly acid to neutral in reaction.

The available moisture capacity is moderate to low, and permeability is rapid because of the high content of sand. Reaction is slightly acid to neutral. These soils have the colors of a somewhat poorly drained soil, though the water table remains high for only a few days each year. Flooding also occurs at times. It generally is not much of a hazard, however, because these soils are at a somewhat higher elevation than the other soils on flood plains. About 1 year out of every 5, flooding occurs for short periods early in spring. The content of organic matter and nitrogen is medium, but the content of phosphorus and potassium is low.

Representative profile of Landes fine sandy loam (200 feet southwest along a road from a road bridge near the center of sec. 36 and 20 feet south in a field, T. 9 N., R. 5 W.):

A1—0 to 10 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, medium, granular structure; very friable; neutral; abrupt, irregular boundary.

C1—10 to 14 inches, brown (10YR 5/3) fine sandy loam; single grain; loose to very friable; slightly acid to neutral; gradual, smooth boundary.

C2—14 to 30 inches, pale-brown (10YR 6/3) heavy loamy fine sand; many, medium, prominent, reddish-brown (5YR 4/4) mottles and a few, fine, faint, light brownish-gray (10YR 6/2) mottles; single grain; slightly acid; diffuse, smooth boundary.

C3—30 to 50 inches, light-gray (10YR 7/1) loamy fine sand; many, medium, prominent, strong-brown (7.5YR 4/4) mottles; very friable; contains several layers in which the texture is loam; slightly acid.

Landes soils are not extensive in Montgomery County. They are coarser textured than the Lawson soils.

The loamy fine sand that underlies the Landes soils in Montgomery County is nearer the surface than that underlying the Landes soils in other parts of Illinois.

Landes fine sandy loam (304).—This is the only Landes soil mapped in Montgomery County. It is nearly level and occurs on the flood plains of the West Fork of Shoal Creek. The largest area is east of Litchfield. The profile is the one described for the Landes series.

Most of the water from rainfall is absorbed by this soil, and little water runs off. The water moves rapidly downward through the profile. As a result, only a moderate to small amount is retained and made available to plants. A sandy soil, such as this one, cannot store the large amounts of plant nutrients that can be stored by a clayey soil. Because of the possibility of losses caused by leaching, therefore, applying moderate amounts of phosphorus and potassium to each crop is better than applying bulk applications. This soil has a medium supply of nitrogen, but nitrogen fertilizer is still needed, especially for corn.

This soil is suited to corn and soybeans but is less well suited to clover, alfalfa, and wheat. Corn is presently the main crop. (Management group IIIs–1, woodland group 6)

Lawson Series

Soils that are deep, dark colored, and somewhat poorly drained are in the Lawson series. These soils have developed in mixed silty and loamy alluvium on bottom lands throughout the county. Originally, they had a cover of mixed forest and grasses.

In most places the surface layer, about 18 inches thick, is very dark grayish-brown silt loam that has granular structure and is mildly alkaline. Beneath the surface layer is a layer of very dark gray gritty silt loam that is about 21 inches thick and has subangular blocky structure. At a depth of about 39 inches, that material, in turn, is underlain by very dark gray loam that also has subangular blocky structure.

Reaction is mildly alkaline throughout the profile, and lime is generally not needed. Though drainage is somewhat poor, the water table is usually low. At times it is high, however, for a short time after heavy rains, usually late in winter or early in spring. The available moisture capacity is high, and permeability is moderate. The content of organic matter, nitrogen, phosphorus, and potassium is high.

Representative profile of Lawson silt loam (60 feet west and 25 feet north of bridge on road in SW10, SW40, SE160, sec. 21, T. 9 N., R. 3 W.):

A11—0 to 18 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine and medium, granular structure; friable; few small pebbles; mildly alkaline; gradual, smooth boundary.

A12—18 to 39 inches, very dark gray (10YR 3/1) gritty silt loam; weak, medium, subangular blocky structure; friable; few small pebbles; mildly alkaline; diffuse, smooth boundary.

A13—39 to 53 inches +, very dark gray (10YR 3/1) loam; weak, medium, subangular blocky structure; friable; few small pebbles; mildly alkaline.

In many places these soils are lighter colored below a depth of 24 inches than is indicated in the profile described for the series. In those areas the colors range from dark gray to dark grayish brown. The surface layer of typical Lawson soils contains enough sand to give it a gritty feel.

The Lawson soils lack the underlying layer of silty clay loam that is typical in the profile of the Radford soils.

Lawson silt loam (0 to 2 percent slopes) (451).—This is the only Lawson soil mapped in Montgomery County. It is on bottom lands and is nearly level.

Included with this soil in mapping were a few small areas of a soil that contains layers of sandy loam that are generally less than 8 inches thick. Also included were a few areas in which sand is within 40 inches of the surface. Other inclusions consist of small areas that are covered by a layer, as much as 12 inches thick, of light-colored, recently deposited silt loam that has washed from the adjacent uplands.

Lawson silt loam is frequently flooded, but the floodwaters generally remain for only a short time. Flooding normally occurs early in spring, but it occurs occasionally in fall. When flooding occurs in fall, crops that are not yet harvested are damaged.

This soil is used mainly for corn and soybeans, but some areas that are least susceptible to flooding are used for small grains and red clover. Diversion terraces and open ditches can be used to help keep runoff from spreading out over this soil and causing damage. In some areas where flooding is infrequent and does not last long, and where the soil does not contain layers of sand, tile drains can be used to improve drainage. Where this soil contains layers of sand, however, it is not suited to tile drains, because the sand washes into the drains and fills them. (Management group I-3, woodland group 6)

Negley Series

The Negley series consists of well-drained, rolling to very steep, light-colored soils that developed in coarse-textured glacial material, principally sand and gravel. These soils are adjacent to streams and on rounded knolls in the uplands. They are in the southern and eastern parts of the county, in areas that originally were covered with forests of mixed hardwoods.

In most places the surface layer is about 6 inches thick and consists of dark grayish-brown loam that has granular structure and is slightly acid to neutral in reaction. The subsurface layer, about 3 inches thick, is dark-brown to brown loam that has subangular blocky structure and is medium acid. The subsoil is about 39 inches thick and is reddish-brown to brown loam to sandy clay loam. It has subangular blocky structure and is medium acid to very strongly acid. The underlying material is brown heavy sandy loam that is massive and is strongly acid.

Permeability is moderately rapid, and the available moisture capacity is moderate. The reaction is medium acid to strongly acid. In general, these soils are low in content of organic matter, nitrogen, phosphorus, and potassium.

Meadow crops can be grown on some of the rolling areas. Most of the areas are too steep for meadow, however, but are suitable for trees or pasture. Pines grow well on these soils.

Representative profile of a Negley loam (450 feet east of the NW. corner of SW160, sec. 28, T. 8 N., R. 4 W., along south side of a private road):

A1—0 to 6 inches, dark grayish-brown (10YR 4/2) loam; strong, fine, granular structure; friable; slightly acid to neutral; abrupt, broken boundary.

A2—6 to 9 inches, dark-brown to brown (7.5YR 4/4) loam; weak, fine, subangular blocky structure; friable; medium acid; abrupt, broken boundary.

B1t—9 to 13 inches, reddish-brown (5YR 4/4) loam; moderate, medium, subangular blocky structure; friable; strongly acid to medium acid; gradual, smooth boundary.

B2t—13 to 36 inches, reddish-brown (5YR 4/4) sandy clay loam; moderate to weak, subangular blocky structure; friable when moist, sticky and plastic when wet; very strongly acid; gradual, smooth boundary.

B3t—36 to 48 inches, brown (7.5YR 5/4) heavy sandy loam or light sandy clay loam; weak, coarse, angular blocky structure, with reddish-brown (5YR 4/4) clay films on the faces of the peds; friable when moist, nonsticky and nonplastic when wet; strongly acid; diffuse, smooth boundary.

C—48 to 109 inches +, brown (7.5YR 5/4) heavy sandy loam to sandy clay loam; massive; friable when moist, nonsticky and nonplastic when wet; strongly acid.

Pebbles less than 1 inch in diameter constitute 10 to 20 percent of the soil mass. In many places the C horizon consists of loose sand or gravel that in places is calcareous.

Negley soils occupy small areas adjacent to or within areas of Hickory soils. Because the Negley soils and some areas of Hickory soils are steep and are used and managed in the same way, they have been mapped in an undifferentiated unit, which is described under the Hickory series.

Nokomis Series

Dark-colored, somewhat poorly drained, gently sloping soils that developed in mixed silty and loamy alluvial material are in the Nokomis series. These soils are on alluvial fans and stream terraces in the valleys of the major streams throughout the county. Originally, they had a cover of mixed grasses and bottom-land hardwoods.

In most places the surface layer is about 9 inches thick and consists of black silt loam to loam. It has granular structure and is slightly acid to neutral. The subsurface layer, about 7 inches thick, is mottled grayish-brown silt loam to loam that has subangular blocky structure. It is slightly acid to neutral in reaction. The subsoil is 34 inches or more thick, is grayish brown in the upper part and gray in the lower part, and is mottled with strong brown. It has a texture of heavy loam to silty clay loam, has subangular blocky structure, and is neutral to medium acid in reaction.

Nokomis soils have the typical grayish color of somewhat poorly drained soils, but a high water table limits the growth of crops only during extremely wet periods. These soils are moderately permeable and have high available moisture capacity. They have a medium content of organic matter, phosphorus, and potassium.

Representative profile of Nokomis silt loam (216 feet south along a field boundary west of a highway bridge over East Fork Shoal Creek in the NE10, SW40, NW160, sec. 31, T. 8 N., R. 2 W.):

A1—0 to 9 inches, black (10YR 2/1) silt loam to loam; moderate, medium, granular structure; friable; slightly acid to neutral; abrupt, irregular boundary.

A2—9 to 16 inches, grayish-brown (10YR 5/2) silt loam to loam; a few, medium, prominent, brown to dark-brown (7.5YR 4/4) mottles and many, fine, faint, brown (10YR 5/3) mottles; weak, medium, subangular blocky structure; friable; slightly acid to neutral; diffuse, smooth boundary.

B1t—16 to 40 inches, grayish-brown (10YR 5/2) heavy loam to light clay loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles and a few, fine, prominent, black (5YR 2/1) mottles; moderate, medium, subangular blocky structure; when dry, peds are coated with light-gray (10YR 7/1) sand grains; friable to firm; slightly acid to neutral; clear, smooth boundary.

B2t—40 to 50 inches, gray (10YR 5/1) gritty light silty clay loam; many, coarse, prominent, strong-brown (7.5YR 5/4 to 5/8) mottles; massive, but contains some large cleavage planes; thin, gray (10YR 5/1) clay films in the cleavage planes; firm; few small pebbles; common large pores; medium to slightly acid.

The content of silt and sand throughout the profile varies considerably. In many places the texture is loamy throughout the profile, but it is gritty silt loam in places.

Nokomis soils are not so well drained as the Terril soils and are darker colored than the Starks and Camden soils. They have a slight accumulation of clay in the subsoil that is lacking in the subsoil of the Lawson soils.

Nokomis silt loam (1 to 3 percent slopes) (586).—This is the only Nokomis soil mapped in Montgomery County. It is gently sloping and occurs on alluvial fans and stream terraces. The profile is the one described for the series. Included in mapping were a few areas in which the slopes are slightly steeper than 3 percent, and a few areas in which the profile contains layers of sandy loam.

Because Nokomis silt loam is at a slightly higher elevation than the surrounding soils of the bottom lands, it normally is not flooded. During periods of severe overflow, however, some areas are flooded for short periods. In places diversion ditches are needed to keep water that runs off the adjacent higher lying soils from spreading out over this soil and causing damage. Erosion is not a serious hazard.

This soil is moderately well suited to well suited to the crops commonly grown in the county, but it needs proper fertilization and good management. It can be used for hay, pasture, or trees, but most of the acreage is in corn and soybeans. (Management group I–2, woodland group 5)

Oconee Series

The Oconee series consists of deep, moderately dark colored, nearly level to sloping soils that are somewhat poorly drained. These soils have developed in loess under prairie vegetation and are on uplands in the central and southern parts of the county. They have a dense, compact subsoil, commonly called a claypan.

In most places the surface layer is about 8 inches thick. It consists of very dark gray to dark grayish-brown silt loam that has granular structure and is medium acid to slightly acid. The subsurface layer, about 7 inches thick, consists of grayish-brown silt loam. It has platy structure and is strongly acid to very strongly acid. The subsoil, about 35 inches thick, is grayish-brown, brown, and yellowish-brown silty clay loam that is mottled with gray and yellowish brown and has blocky structure. The upper part of the subsoil is very strongly acid, but the reaction ranges to slightly acid in the lower part.

Because of the slight to moderate slopes, water drains readily from the surface of these soils in most places, but it percolates slowly downward after the soils are wet. As a result, these soils dry out slowly in spring. The planting of crops, especially oats, is often delayed. The available moisture capacity is high. The content of phosphorus and potassium is low, and the reaction is strongly acid, except where the plow layer has received lime. These soils are well suited to corn, soybeans, wheat, and other cultivated crops commonly grown in the county.

Representative profile of an Oconee silt loam (342 feet west of the junction of a county road and State Route 127 and along the south right-of-way of the road in sec. 29, SE160, NW40, NW10, T. 10 N., R. 4 W.):

A1—0 to 8 inches, very dark gray (10YR 3/1) to dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; medium to slightly acid; clear, smooth boundary.

A21—8 to 12 inches, grayish-brown (10YR 5/2) silt loam; weak, thin, platy structure; friable; strongly acid to very strongly acid; clear, wavy boundary.

A22—12 to 15 inches, grayish-brown (10YR 5/2) silt loam; weak to moderate, thin, platy structure, with many coatings of gray to light gray (10YR 6/1) on the structural aggregates; friable; strongly acid to very strongly acid; abrupt, smooth boundary.

B21t—15 to 28 inches, grayish-brown (10YR 5/2) silty clay loam to silty clay; few, fine, prominent, yellowish-brown (10YR 5/6) mottles; moderate, fine, angular blocky structure, with continuous, thin, grayish-brown (10YR 5/2) clay films on the surfaces of the structural aggregates; firm when moist, plastic when wet; very strongly acid; clear, smooth boundary.

B22t—28 to 43 inches, brown (10YR 5/3) silty clay loam; many, fine, distinct, gray (10YR 5/1) mottles and a few, fine, prominent, yellowish-brown (10YR 5/8) mottles; very weak, fine and medium, angular blocky structure; a few, thin, grayish-brown (10YR 5/2) clay films; firm when moist, plastic when wet; strongly acid; gradual, smooth boundary.

B3t—43 to 50 inches, yellowish-brown (10YR 5/4) silty clay loam to silt loam; many, fine, distinct, light brownish-gray (10YR 6/2) mottles and a few, medium, prominent, strong-brown (7.5YR 5/6) mottles; massive; firm; few fine pores filled with very dark gray (10YR 3/1) clay films; medium acid to slightly acid.

In places the reaction in the B22t horizon ranges to mildly alkaline below a depth of 40 inches.

Oconee soils occur with O'Fallon soils in many places, but they lack the friable upper subsoil that is typical in the O'Fallon profile. The Oconee soils are better drained than the Cowden soils, and they have developed in a thicker layer of loess than the Hoyleton soils. Their profile is similar in many respects to that of the Hoyleton soils, but it lacks reddish colors in the upper part of the subsoil.

Oconee silt loam, 0 to 2 percent slopes (113A).—This soil has the profile described for the series. In most places it is on small rises, at a slightly higher elevation than the surrounding soils.

This soil is well suited to corn, soybeans, and wheat, and the cropping system generally used is one in which those crops are grown most of the time. In most places the slight slope provides adequate surface drainage. (Management group IIw–2, woodland group 7)

294-384—69——3

Oconee silt loam, 2 to 4 percent slopes (113B).—This soil is on low knolls and in areas adjacent to small drainageways. It is mainly in the central and southern parts of the county.

Erosion is a hazard. Therefore, this soil needs to be used for meadow occasionally, even though such practices as terracing and tilling on the contour are used to help control erosion. Where tillage is not on the contour, a suitable cropping system is one in which this soil is kept in meadow about half the time. (Management group IIe-4, woodland group 7)

Oconee silt loam, 2 to 4 percent slopes, eroded (113B2).—This gently sloping soil is generally adjacent to small drainageways. Erosion has removed part of the original surface layer. The present plow layer is very dark grayish-brown silt loam, and it rests upon the uppermost layer of the subsoil. In some places the plow layer contains some material from the subsoil that has been mixed into it as a result of erosion and subsequent plowing. Included in mapping were small areas in which the plow layer now extends into the upper part of the subsoil.

Contour tillage and terraces help to prevent further erosion of this Oconee soil. (Management group IIe-4, woodland group 7)

Oconee silt loam, 4 to 7 percent slopes (113C).—In places this sloping soil is on slight knolls, but it generally occupies areas adjacent to small drainageways. The surface layer is somewhat thinner than the one in the profile described for the series, and it is dark grayish brown. A few small areas of Tamalco soils were included in this mapping unit.

This Oconee soil is subject to serious erosion. It can be protected from erosion by practicing contour tillage, terracing, and using a cropping system in which meadow crops are grown one-third of the time. (Management group IIIe-2, woodland group 7)

Oconee silt loam, 4 to 7 percent slopes, eroded (113C2).—This is a sloping soil adjacent to small drainageways. Erosion has removed part of the original surface layer, and the present plow layer is very dark grayish brown. In many places the present surface layer contains small lumps of subsoil that have been mixed into it by plowing. It rests directly on the subsoil.

Included with this soil in mapping were small areas in which the grayish-brown subsoil is exposed. In those areas plowing is mainly in the subsoil. Erosion control practices, such as contour tillage and terracing, are needed. Those practices and using a cropping system in which meadow crops are grown at least one-third of the time help to control erosion. (Management group IIIe-2, woodland group 7)

Oconee-Tamalco complex, 0 to 2 percent slopes (994A).—This soil complex consists of a somewhat poorly drained Oconee soil and a moderately well drained Tamalco soil. These soils occur in such an intricate pattern that separating them on the soil map was not feasible. The proportions of each soil vary considerably from place to place. In many areas the proportions of Oconee and Tamalco soils are about equal, but in others one soil is much more extensive than the other.

These soils are on small knolls and ridges, as well as in areas adjacent to streams. They are mainly in the central and western parts of the county, generally at a slightly higher elevation than the surrounding soils. The dominant slopes are between 1 and 2 percent, and the average length of the slopes is about 200 feet.

The surface layer of these soils ranges from 7 to 14 inches in thickness, but the Tamalco soil has a thinner surface layer than the Oconee. Both of these soils have a moderately dark colored surface layer, but the Tamalco soil has a somewhat lighter colored surface layer than the Oconee. This is most noticeable in a recently plowed field after a heavy rain. The lower part of the Tamalco subsoil, unlike that of the Oconee, is alkaline and is high in content of exchangeable sodium. The profile of the Oconee soil is similar to the one described for the Oconee series. A typical profile of the Tamalco soil is described under the Tamalco series.

Some areas of these soils are too wet for tillage early in spring because the downward movement of water through the profile is slow. Especially during periods of dry weather, crops do not grow as well on the Tamalco soil as on the Oconee. The Tamalco soil has somewhat lower available moisture capacity than the Oconee because roots cannot penetrate the dense lower subsoil. Also, the alkaline reaction in the lower part of the Tamalco subsoil limits the availability of phosphorus and potassium. Because of deficiencies in those elements, the pattern in which these soils occur can be seen in many fields if one observes the color and height of the plants in different areas. In some places corn growing on the Tamalco soil, for example, is purple instead of green, and alfalfa and clover are bluish green instead of the normal green that is typical of crops growing on soils that have better moisture-supplying and nutrient-supplying capacities.

The soils of this complex are used mainly for field crops and meadow, but they need good management and proper fertilization. Even after they have been properly managed and fertilized, however, they are still not well suited to the crops commonly grown in the county. (Management group IIw-2, woodland group 7)

Oconee-Tamalco complex, 2 to 4 percent slopes (994B).—The soils of this complex are gently sloping and occupy convex ridges and areas adjacent to drainageways. Their profiles are like the ones described as representative for the Oconee and Tamalco series. Usually, the Tamalco soil can be distinguished from the Oconee by its thinner surface layer and by the poorer growth of crops. Permeability of the Tamalco soil is slower than that of the Oconee soil. Therefore, the Tamalco soil often remains wet for longer periods after rains than does the Oconee soil.

These soils are used mainly for growing grain and meadow crops. Practices are needed that help to control erosion. Where contour tillage and terracing are practiced, a cropping system in which meadow crops are grown about two-fifths of the time helps to control erosion. If those practices are not used, a suitable cropping system is one that consists mainly of meadow crops. (Management group IIIe-3, woodland group 7)

Oconee-Tamalco complex, 2 to 4 percent slopes, eroded (994B2).—This soil complex consists of sloping soils on convex ridges and in areas adjacent to drainageways. The profiles of these soils are similar to the ones described for the Oconee and the Tamalco series. The subsurface layers have been incorporated in the plow layer, however, as a result of plowing and erosion. The Tamalco soil is more eroded than the Oconee. It can be distinguished from the Oconee soil by its thinner surface layer and by the poorer growth of crops during periods of dry weather. Included with these soils in mapping were small areas in which the plow layer consists mainly of material from the subsoil.

Water moves slowly downward in the soils of this complex. As a result, some areas remain too wet for tillage early in spring, and some areas contain small localized seepy spots.

Their undesirable characteristics make these soils only moderately well suited to the grain crops commonly grown in the county, even though good management is used and the soils are properly fertilized. Practices that help to control erosion are needed. Where tillage is on the contour and terraces have been installed, using a cropping system in which meadow crops are grown about two-fifths of the time helps to control erosion. If no practices are used that provide protection, using the soils mainly for meadow, and growing a row crop only occasionally, will help to control erosion. (Management group IIIe–3, woodland group 7)

Oconee-Tamalco complex, 4 to 7 percent slopes, eroded (994C2).—In this soil complex are sloping soils on ridges or in areas along drainageways. The profiles are similar to the ones described for the Oconee and Tamalco series, except that the subsurface layers have been incorporated in the plow layer as the result of plowing and erosion. The Tamalco soil contains a greater number of eroded, bare spots than the Oconee soil. It has a plow layer of grayish-brown silt loam that in many places has small lumps of brown material from the subsoil mixed into it. Included in mapping were small areas in which the plow layer consists mainly of material from the subsoil.

Because most of the surface layer has been lost through erosion, the capacity for storing water has been reduced in the soils of this complex. The available moisture capacity is moderate to low, but it is lower in the Tamalco soil than in the Oconee. As a result, the Tamalco soil can generally be distinguished from the Oconee by the poorer growth of crops during periods of dry weather. A greater amount of water runs off these soils and less water soaks in than in the soils of other Oconee-Tamalco complexes.

These soils are used mainly for grain crops, hay, and pasture. If tillage is excessive, the structure of the plow layer tends to break down and a cloddy seedbed results. Fall plowing is not a good practice, because further serious erosion is likely to take place. Practices are needed that help to control erosion if these soils are used for crops. Where contour tillage and terraces are used, a suitable cropping system is one in which the soils are kept in meadow three-fifths of the time. If no practices are used that help to control erosion, a suitable cropping system consists of growing meadow crops most of the time and a small grain only occasionally. (Management group IIIe–3, woodland group 7)

O'Fallon Series

The O'Fallon series consists of moderately well drained, dark-colored, gently sloping soils that are moderately deep over a fragipan. These soils are on uplands, where they have developed in loess under the influence of prairie vegetation, or possibly mixed prairie and forest vegetation. They are on ridges and low knolls in the central and southern parts of the county.

In most places the surface layer is about 12 inches thick and consists of very dark grayish-brown silt loam that has granular structure and is slightly acid to neutral. It is underlain by a layer of heavy silt loam, about 3 inches thick, that has granular and subangular blocky structure and is very strongly acid. The upper part of the subsoil is about 10 inches thick and consists of yellowish-brown light silty clay loam. It has subangular blocky structure and is very strongly acid. The lower part of the subsoil, about 19 inches thick, is brown or dark yellowish-brown silty clay loam that is mottled with grayish brown or brown, has blocky or prismatic structure, and is very strongly acid. The underlying material is gray to light-gray heavy silt loam to light silty clay loam that is massive, is very firm when moist, and is brittle when dry. This material is very strongly acid.

The lower part of the subsoil and the underlying material constitute a fragipan that restricts permeability and limits the depth to which roots extend. Consequently, these soils are moderately permeable in the upper part and only slowly permeable in the lower part. They have moderate available moisture capacity, are medium in content of organic matter, nitrogen, and potassium, and are low in content of phosphorus. Except where the plow layer has received lime, these soils are strongly acid throughout the profile.

Representative profile of one O'Fallon silt loam (1,700 feet west of the SE. corner of sec. 33, T. 9 N., R. 3 W., and immediately north of the road right-of-way) :

A1—0 to 12 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; slightly acid to neutral; gradual, smooth boundary.

AB—12 to 15 inches, dark-brown (10YR 3/3) heavy silt loam; many, fine, faint, dark yellowish-brown (10YR 4/4) mottles; strong, medium, granular and subangular blocky structure; friable when moist, sticky and plastic when wet; very strongly acid; clear, smooth boundary.

B2t—15 to 25 inches, yellowish-brown (10YR 5/4) light silty clay loam; common, fine, distinct mottles of dark brown to brown (7.5YR 4/4) or grayish brown (10YR 5/2); moderate, medium, subangular blocky structure; light-gray (10YR 7/1) silt coatings over 10 percent of the exterior of the structural aggregates; firm when moist, sticky and plastic when wet; very strongly acid; clear, smooth boundary.

A'2&B't—25 to 31 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; strong, medium, prismatic structure breaking to moderate, medium, angular blocky structure in the lower part; structural aggregates covered with light-gray (10YR 6/1) silt grains, which give the horizon a distinct light-gray appearance; continuous, grayish-brown (10YR 5/2) clay films that tend to be much thicker on the vertical faces of the aggregates than on the horizontal faces; very firm when moist, sticky and plastic when wet; very strongly acid; gradual, smooth boundary.

B'x1—31 to 38 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, fine, distinct, grayish-brown (10YR 5/2) mottles; moderate, coarse, prismatic structure breaking to moderate, medium, angular blocky structure; dark grayish-brown (10YR 4/2) clay films on the aggregates; very firm when moist, sticky and plastic when wet; very strongly acid; gradual, smooth boundary.

B'x2—38 to 44 inches, grayish-brown (10YR 5/2) silty clay loam; many, medium, prominent, brown to dark-brown (7.5YR 4/4) mottles; weak, coarse, prismatic structure; very firm when moist, very sticky and very plastic when wet; when dry, has a few patches of light gray (10YR 7/1); very strongly acid; clear, smooth boundary.

Cx—44 to 50 inches, gray to light-gray (10YR 6/1) heavy silt loam to light silty clay loam; many, coarse, prominent, yellowish-brown (10YR 5/4) mottles; massive; very firm when moist, brittle when dry, sticky and plastic when wet; very strongly acid.

O'Fallon soils occur with Oconee and Hosmer soils. They are better drained than the Oconee soils and are darker colored than the Hosmer.

O'Fallon silt loam, 2 to 4 percent slopes (114B).—This is the only O'Fallon soil mapped in Montgomery County. It is generally on low ridges or ridge points, at a higher elevation than the surrounding soils. Its profile is the one described for the O'Fallon series. Included with it in mapping were small areas in which the surface layer is thin, and other small areas in which the slopes are as steep as 6 percent.

This O'Fallon soil is less well suited to the crops commonly grown in the county than are most of the other dark-colored soils. Controlling erosion and applying the proper kinds and amounts of fertilizer are important management practices. If contour tillage or terracing is practiced, a cropping system in which this soil is used for meadow one-fourth of the time helps to control erosion. Where rotation of crops is the only means used to control erosion, a cropping system in which this soil is used for meadow one-half of the time is necessary. Managing crop residue well and keeping tillage to a minimum are other desirable practices. (Management group IIe–3, woodland group 2)

Pana Series

Deep, dark-colored soils that are well drained and are sloping to strongly rolling are in the Pana series. These soils are on the higher parts of morainal ridges in the central and eastern parts of the county.

In most places the surface layer is about 8 inches thick and consists of very dark brown to very dark grayish-brown silt loam. It has granular to subangular blocky structure and is strongly acid. Beneath the surface layer is a layer, about 4 inches thick, of very dark brown to very dark grayish-brown heavy silt loam that has subangular blocky structure and is strongly acid. The subsoil is about 49 inches thick and consists of dark-brown or reddish-brown gravelly clay loam to loam that has subangular blocky structure and is strongly acid. Beneath the subsoil is reddish-brown, strongly acid gravelly loam that, in turn, is underlain by stratified gravel and sand (fig 9).

Pana soils have moderately rapid permeability but moderate available moisture capacity. They are medium to high in content of organic matter and nitrogen, and low in content of phosphorus and potassium. Except in areas where the plow layer has received lime, they are strongly acid. If these soils are to be cropped regularly, practices are needed that help to control erosion.

Representative profile of a Pana silt loam (320 feet south and 50 feet west of the NE. corner of sec. 3, T. 10 N., R. 1 W.):

A1—0 to 8 inches, very dark brown (10YR 2/2) to very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular to moderate, fine, subangular blocky structure; friable; few rounded pebbles; strongly acid; clear, irregular boundary.

AB—8 to 12 inches, very dark brown (10YR 2/2) to very dark grayish-brown (10YR 3/2) gritty heavy silt loam; common, fine, distinct, brown (7.5YR 4/4) mottles caused by mixing of material from the A horizon and well-oxidized material from the B horizon; moderate, very fine, subangular blocky structure; friable; few rounded pebbles; strongly acid; clear, irregular boundary.

Figure 9.—A gravel pit in an area of Pana soils. The substratum of these soils is a source of gravel and sand that can be used as subgrade for highways.

B2t—12 to 27 inches, dark-brown (7.5YR 4/4 and 7.5YR 3/2) gravelly clay loam; moderate to strong, very fine, subangular blocky structure; dark-brown (7.5YR 3/2) clay films; firm; strongly acid; diffuse, smooth boundary.

B3t—27 to 61 inches, reddish-brown (5YR 4/4) gravelly clay loam to loam; weak, coarse, subangular blocky structure; strongly acid; diffuse, smooth boundary.

C1—61 to 96 inches, reddish-brown (5YR 4/4) gravelly loam; strongly acid; diffuse, wavy boundary.

C2—96 to 100 inches, brown (7.5YR 4/2) to light-brown (7.5YR 6/4) stratified gravel and sand cemented by secondary carbonates in some places.

The surface layer of typical Pana soils contains enough sand to give it a gritty feel. The content of sand and gravel in the profile varies considerably in the various horizons. Depth at which the calcareous gravelly or sandy C horizon generally occurs ranges from 80 to 100 inches. Many vertical pores, 2 to 5 millimeters in diameter, extend through the subsoil.

Pana soils occur with Douglas soils but are coarser textured than those soils. They are darker colored than the Negley soils.

Pana loam, 4 to 7 percent slopes, eroded (256C2).—In most places this soil has the profile described for the series, but the surface layer is thinner in some places. In those areas the plow layer consists of a mixture of surface soil and subsoil.

Corn, soybeans, wheat, and other crops are grown on this soil. If contour tillage, terracing, or similar practices are used that help to control erosion, row crops can be grown one-half of the time in the cropping system without excessive losses from erosion. If those practices are not used, erosion is a serious hazard if row crops are grown more often than every fourth year. (Management group IIe–2, woodland group 7)

Pana loam, 7 to 14 percent slopes, eroded (256D2).—The plow layer of this soil is a mixture of surface soil and subsoil. This soil is suitable for growing row crops every fourth year if such practices as contour tillage or terracing are used. It is moderately well suited to corn and soybeans.

Growing small grains and meadow crops is generally more feasible, however, than growing corn and soybeans. (Management group IIIe-1, woodland group 7)

Piasa Series

Soils of the Piasa series are on uplands and are deep, moderately dark colored, and poorly drained. They have developed in loess under prairie vegetation. The subsoil of these soils is alkaline and contains a large amount of exchangeable sodium.

In most places the surface layer is about 8 inches thick and consists of very dark gray silt loam that has granular structure and is slightly acid to neutral in reaction. The subsurface layer, about 4 inches thick, is also very dark gray silt loam, but it has platy structure and is neutral to mildly alkaline in reaction. The subsoil is about 25 inches thick and is dark grayish-brown silty clay loam to silty clay. It has angular blocky structure and is mildly alkaline to moderately alkaline. The uppermost layer of underlying material, about 11 inches thick, is grayish-brown heavy silt loam that has angular blocky structure and is mildly alkaline. Below is gray gritty silt loam that also has blocky structure and is mostly mildly alkaline.

When this soil is fully moist, it is very slowly permeable, but water enters cracks when the soil is dry. The available moisture capacity is moderate, and the content of organic matter and nitrogen is medium. Unlike most of the soils in Montgomery County, these soils have an alkaline subsoil and contain excessive sodium that has been absorbed by the clay in the subsoil. Phosphorus and potassium are generally needed, though soil tests indicate that the content of these elements is high.

If these soils are properly fertilized, they are suited to corn, soybeans, wheat, alfalfa, and other crops commonly grown in the county. In sloping areas, however, erosion is a serious hazard.

Representative profile of a Piasa silt loam (277 feet west and 85 feet south of the NE. corner of sec. 26, T. 9 N., R. 4 W.); laboratory data for this profile are given in the section "Laboratory Data for Selected Soil Profiles"):

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam; weak, fine, granular structure; friable; slightly acid to neutral; abrupt, smooth boundary.

A2—8 to 12 inches, dark-gray (10YR 4/1) silt loam; moderate, thin and medium, platy structure; when dry, the peds are lightly coated with light-gray (10YR 7/1) silt grains; friable; few, fine, distinct pores filled with black (10YR 2/1) soil material; neutral to mildly alkaline; abrupt, wavy boundary.

B21t—12 to 16 inches, dark grayish-brown (2.5Y 4/2) light silty clay loam; common, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; moderate to strong, fine, angular blocky structure; moderately thick, grayish-brown (10YR 5/2) clay films on the peds; when the soil material is dry, columns that are 4 to 10 inches in diameter and that have slightly rounded caps are apparent; firm; mildly alkaline; clear, smooth boundary.

B22t—16 to 20 inches, dark grayish-brown (2.5Y 4/2) light silty clay; few, fine, faint, very dark grayish-brown (2.5Y 3/2) mottles; moderate, medium and coarse, angular blocky structure; moderately thick, black (10YR 2/1) clay films on the peds; firm when moist, sticky when wet; mildly alkaline; clear, smooth boundary.

B23t—20 to 26 inches, dark grayish-brown (2.5Y 4/2) silty clay loam to silty clay; common, fine, faint, olive-brown (2.5Y 4/4) mottles; moderate to weak, medium and coarse, angular blocky structure; moderately thick to thin, black (10YR 2/1) clay films on the peds; firm when moist, sticky when wet; moderately alkaline; clear, smooth boundary.

B24t—26 to 33 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; few, fine, prominent, strong-brown (7.5YR 5/8) mottles; weak to moderate, medium, angular blocky structure; a few very dark gray (10YR 3/1) clay films on the peds; firm when moist, slightly sticky when wet; moderately alkaline; clear, smooth boundary.

B3—33 to 37 inches, dark grayish-brown (2.5Y 4/2) light silty clay loam; weak, coarse, angular blocky structure; a few dark-gray (10YR 4/1) clay films on the peds; firm to friable; mildly alkaline; clear, smooth boundary.

C1—37 to 48 inches, grayish-brown (2.5Y 5/2) heavy silt loam; many, coarse, prominent, yellowish-brown (10YR 5/8) mottles; weak, coarse, angular blocky structure to massive; gray (10YR 5/1) clay films more common than in the B3 horizon; friable to firm; mildly alkaline; clear, smooth boundary.

IIC2—48 to 55 inches, gray (10YR 5/1) gritty silt loam; many, medium, prominent, yellowish-brown (10YR 5/8) and reddish-brown (5YR 4/4) mottles; weak, coarse, angular blocky structure; a few dark-gray (10YR 4/1) clay films on the peds; friable; mildly alkaline; gradual, smooth boundary.

IIC3—55 to 62 inches, gray (10YR 5/1) gritty light silty clay loam; many, medium, prominent, yellowish-brown (10YR 5/8) mottles; massive to weak, coarse, angular blocky structure; neutral to mildly alkaline.

Piasa soils occur with Herrick and Cowden soils in such a complex pattern that it was not feasible to show these soils separately on the soil map. Instead, they have been mapped in complexes with Herrick and Cowden soils. Representative profiles of the Herrick and Cowden soils are described under the Herrick and Cowden series.

Piasa soils have a lighter colored surface layer than the Herrick and Cowden soils. They have a profile similar to that of the Huey soils, but their plow layer and subsoil are darker colored. The Piasa soils have a thinner surface layer and a higher content of exchangeable sodium in the subsoil than do the Cowden soils. Also, they have an alkaline instead of an acid subsoil.

Pike Series

Soils of the Pike series are light colored, well drained, and nearly level to rolling. They have developed in loess under a forest of hardwoods. These soils are on morainal ridges in the southern and eastern parts of the county and are also southwest of the city of Hillsboro.

In most places the surface layer is about 6 inches thick and consists of very dark grayish-brown to dark grayish-brown silt loam that has granular structure and is slightly acid. The subsurface layer, about 4 inches thick, is mainly brown silt loam that has platy structure and is also slightly acid. The subsoil is about 36 inches thick and is brown to dark-brown mainly silty clay loam. It has subangular blocky structure and is slightly acid to strongly acid. The underlying material is reddish-brown to strong-brown heavy loam to silt loam that has subangular blocky structure and is strongly acid.

Pike soils are moderately permeable and have high available moisture capacity. They are low in content of organic matter and nitrogen and medium in content of phosphorus and potassium. Except where the plow layer has received lime, they are generally medium acid to strongly acid. Proper fertilization and practices that control erosion are needed.

Representative profile of a Pike silt loam (600 feet east along a private road and 10 feet south of the NW. corner of the SW160, sec. 28, T. 8 N., R. 4 W.):

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) silt loam; weak medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2—6 to 10 inches, brown (10YR 5/3) and some dark-brown to brown (10YR 4/3) silt loam; weak, medium, platy structure but breaks readily to very fine, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

B1—10 to 16 inches, brown to dark-brown (7.5YR 4/4) and some small areas of dark grayish-brown (10YR 4/2) heavy silt loam to light silty clay loam; weak to moderate, fine, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

B21t—16 to 24 inches, brown to dark-brown (7.5YR 4/4) medium silty clay loam; strong, fine, subangular blocky structure, with thin clay films on the peds; firm when moist, sticky and plastic when wet; medium acid; clear, smooth boundary.

B22t—24 to 34 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; strong, medium, subangular blocky structure; clay films and a few, fine, prominent, black (10YR 2/1) spots on the faces of the peds; firm when moist, sticky and plastic when wet; strongly acid; gradual, smooth boundary.

B3t—34 to 46 inches, brown to dark-brown (7.5YR 4/4) light silty clay loam; few, fine, faint, pale-brown (10YR 6/3) mottles; moderate, coarse, subangular blocky structure; clay films on the surfaces of the peds; firm when moist, sticky and plastic when wet; strongly acid; abrupt, smooth boundary.

IIAb—46 to 56 inches, reddish-brown (5YR 4/4) and brown to dark-brown (7.5YR 4/4) heavy loam to silt loam; moderate, coarse, subangular blocky structure; thin clay films on the faces of the peds; friable to firm when moist, sticky and plastic when wet; few fine pebbles; strongly acid.

Depth to the underlying heavy loam to silt loam ranges from 30 to 70 inches.

Pike soils have a lighter colored surface layer than the Douglas soils and lack the fragipan that is typical in the profile of the Hosmer soils. They have a silty rather than a loamy texture like the Hickory and Negley soils.

Pike silt loam, 0 to 2 percent slopes (583A).—This soil is on wide ridgetops between stream valleys, southwest of Hillsboro. It has the profile described for the series, but the combined thickness of the surface layer and the subsurface layer is as little as 7 inches in some places and as much as 14 inches in others. The dominant slope is about 1 percent. The original cover was forest, but all of the acreage has now been cleared and is used for cultivated crops.

This soil absorbs more water and is subject to less damage from runoff than the other Pike soils in the county. It is suited to corn, soybeans, and the other crops commonly grown in the county if it is properly fertilized. Corn and soybeans are among the main crops grown. (Management group I–1, woodland group 1)

Pike silt loam, 2 to 4 percent slopes (583B).—This gently sloping soil is in areas adjacent to the larger streams, on narrow drainage divides, and on ridge points. In general, it has the profile described for the series, but the combined thickness of its surface layer and subsurface layer ranges from 7 to 14 inches.

This soil is well suited to the crops commonly grown in the county if it is properly fertilized, and if practices are used that help to control erosion. The main crops are corn, soybeans, wheat, oats, red clover, and alfalfa. Where this soil is terraced, a suitable cropping system is one in which corn and soybeans are grown most of the time and a catch crop is grown once every 4 years. If no erosion control practices are used, a suitable cropping system is one in which meadow crops are grown 2 years out of 5. (Management group IIe–1, woodland group 1)

Pike silt loam, 4 to 7 percent slopes (583C).—This soil is on morainal ridges and on narrow ridgetops and ridge points. The combined thickness of its surface layer and subsurface layer ranges from 7 to 14 inches, but it is about 10 inches in most places. The dominant slope is about 6 percent. Runoff is more extensive and more rapid than on the Pike soils that have slopes of less than 4 percent.

Though proper fertilization and erosion control practices, such as contour tillage and terracing, are needed, this soil is suited to the crops commonly grown in the county. It is used mainly for field crops, hay, pasture, and trees. Where contour tillage and terracing are practiced, a suitable cropping system is one in which meadow crops are grown 2 years out of 5. If no erosion control practices are applied, this soil needs to be kept in meadow most of the time, though a row crop may be grown occasionally. (Management group IIe–2, woodland group 1)

Pike silt loam, 4 to 7 percent slopes, eroded (583C2).—This soil is on morainal ridges, on narrow ridgetops, and in areas adjacent to drainageways. The dominant slope is about 6 percent. The surface layer and subsurface layer are thinner than the ones in the profile described for the series. The plow layer is mainly grayish-brown silt loam but has small lumps of brown material from the subsoil mixed into it in many places. In some small areas, the plow layer consists mainly of material from the subsoil.

Because this soil is sloping and eroded, runoff is more extensive and more rapid than on Pike soils that have slopes of less than 4 percent, and less water enters the soil. As a result, the available moisture capacity is lower than that of Pike soils that have slopes of less than 4 percent, and also less than that of uneroded Pike soils.

This soil is used for field crops, hay, pasture, and trees, but proper fertilization and practices that help to control erosion are needed. If contour tillage is practiced, a suitable cropping system is one in which meadow crops are grown 2 years out of 5. Where this soil is terraced, a cropping system in which meadow crops are grown one-fourth of the time provides effective control of erosion. If no erosion control practices are used, this soil is primarily suited to meadow, though a row crop may be grown occasionally. (Management group IIe–2, woodland group 1)

Pike silt loam, 7 to 12 percent slopes, eroded (583D2).—This is a rolling soil on morainal ridges in areas adjacent to drainageways. Its surface layer and subsurface layer are thinner than the ones in the profile described for the series. The plow layer is mainly grayish-brown silt loam but has small, brown lumps of material from the subsoil mixed into it in many places.

Included with this soil in mapping were a few small areas in which the combined thickness of the surface layer and the subsurface layer is more than 7 inches. Also included are a few small areas in which the present plow layer consists mainly of material from the subsoil.

Runoff is more extensive and more rapid than on the other Pike soils of this county. The plow layer is low in content of organic matter and has poorer structure and a higher content of clay than the plow layers of the uneroded Pike soils. As a result, this soil does not supply as much water for crops as do the uneroded Pike soils. Proper fertilization and practices that help to control erosion are needed. Where contour tillage is practiced, a suitable cropping system is one in which this soil is kept in meadow 3 years out of 5. If terraces have been installed, a suitable cropping system is one in which meadow crops are grown one-half the time. If no erosion control practices are used, this soil needs to be kept in meadow most of the time. This soil is mainly in pasture and hay, but a limited acreage is in trees or is used for recreation. (Management group IIIe–1, woodland group 1)

Racoon Series

Deep, nearly level, poorly drained soils in the valleys of the larger streams are in the Racoon series. These soils are light colored or moderately dark colored. They have developed in silty or loamy material, under forest or under the influence of mixed forest vegetation and grasses.

In most places the surface layer is about 7 inches thick and consists of dark grayish-brown silt loam. It has granular structure and is neutral in reaction. The upper part of the subsurface layer, about 7 inches thick, is dark grayish-brown silt loam that has platy structure and is strongly acid. The lower part, about 10 inches thick, is gray to light-gray silt loam that is structureless (massive) and is very strongly acid to strongly acid. The subsoil is gray to light-gray silty clay loam that has subangular blocky structure. The underlying material is gray light silty clay loam that is massive and is strongly acid.

Racoon soils are medium to low in content of organic matter and nitrogen and low in content of phosphorus and potassium. They are strongly acid. Because these soils are slowly permeable, supplemental drainage should be provided by installing ditches rather than tile drains. Available moisture capacity is high. Many of the areas are subject to overflow during extended rainy seasons.

Representative profile of Racoon silt loam (360 feet east and 30 feet north of the SW. corner of sec. 33, T. 10 N., R. 2 W.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A21—7 to 14 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, prominent, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/8) mottles and a few, fine, faint, dark-gray (10YR 4/1) mottles; moderate, medium, platy structure; friable; strongly acid; abrupt, wavy boundary.

A22—14 to 24 inches, gray to light-gray (10YR 6/1) silt loam; few, fine, prominent, dark yellowish-brown (10YR 4/4) mottles; massive; friable; very strongly acid to strongly acid; clear, smooth boundary.

B1t—24 to 31 inches, gray to light-gray (5Y 6/1) light silty clay loam; weak, medium, subangular blocky structure, with a few thin coatings on the peds; friable; very strongly acid to strongly acid; gradual, smooth boundary.

B2t—31 to 51 inches, gray (5Y 5/1) silty clay loam; moderate, medium, subangular blocky structure, with thin coatings on the peds; firm; strongly acid; gradual, smooth boundary.

B3 or C—51 to 60 inches +, gray (10YR 5/1) light silty clay loam; massive; firm; strongly acid.

The texture of the B horizons ranges from heavy silt loam to silty clay loam, and depth to the B1t horizon varies to some extent. In some places the Ap horizon is darker than the one described in the representative profile.

Racoon soils are adjacent to, or at a slightly higher elevation than, the Lawson soils. They are more poorly drained but are subject to less frequent flooding than the Lawson soils. Also, they have an A2 horizon that is lacking in the Lawson soils.

Racoon silt loam (0 to 2 percent slopes) (109).—This is the only Racoon soil mapped in Montgomery County. It has the profile described for the series. The supply of moisture held available for crops is favorable for crops, and this deep soil is well suited to the crops commonly grown in the county if it is properly fertilized and drained. Most of the acreage is in corn and soybeans. (Management group IIIw–1, woodland group 5)

Radford Series

Soils that are deep, dark colored, and somewhat poorly drained are in the Radford series. These soils are on flood plains of streams in the northern part of the county. The material in which they have developed is recent silty alluvium washed from soils of the uplands. It was deposited over a dark-colored soil that is similar to Colo silty clay loam, and is slightly lighter colored than that buried soil.

In most places the surface layer is about 24 inches thick. It consists of very dark gray silt loam that has granular structure and is neutral in reaction. Beneath the surface layer is a layer of black gritty silty clay loam that has subangular blocky structure and is mildly alkaline.

Radford soils are high in content of organic matter, nitrogen, phosphorus, and potassium. They also have high available moisture capacity, are moderately permeable, and have neutral reaction in the upper part. If tile drains are installed where they have not been previously used, they generally improve drainage. These soils are flooded at times, but most of the flooding takes place early in spring. Therefore, corn, soybeans, and other crops that mature in summer are usually grown.

Representative profile of Radford silt loam (60 feet west and 60 feet south of the NE. corner of NW160, sec. 7, T. 10 N., R. 4 W.):

A11—0 to 24 inches, very dark gray (10YR 3/1) silt loam; few fine, distinct, dusky-red (2.5YR 3/2) mottles; weak, medium, granular structure; friable; contains some small lenses of dark grayish-brown (10YR 4/2) fine sand; neutral; abrupt, smooth boundary.

A12b—24 to 40 inches, black (10YR 2/1) gritty silty clay loam; moderate to strong, fine, subangular blocky structure; friable; mildly alkaline.

The thickness of the A11 horizon varies considerably within short distances. In some areas it is as thick as 40 inches, and in a few places it is as thin as 15 inches.

The profile of the Radford soils is somewhat similar to that of the Lawson soils, but it contains the surface layer of a buried soil that is not present in the Lawson soils.

Radford silt loam (74).—This is the only Radford soil mapped in Montgomery County, and its profile is the one described for the series. This soil is nearly level and is on flood plains. In some areas drainage is fair, but additional drainage is needed in places. Tile drains, if not previously installed, will improve areas where additional drainage is needed. Corn and soybeans are usually successfully grown on this soil because any flooding that takes place generally occurs early in spring. (Management group I–3, woodland group 6)

Shiloh Series

Dark-colored, poorly drained soils are in the Shiloh series. These soils occur in shallow or intermittent lakes in morainal areas in the central and eastern parts of the county. They have developed under swamp grasses in loess or possibly a mixture of loess and fine-textured lakebed sediment.

In most places the present surface layer is about 10 inches thick and consists of recent wash of very dark grayish-brown, medium acid to slightly acid silt loam that was deposited over the original black surface layer. Beneath it is the original surface layer, which is about 8 inches thick and consists of black silty clay loam that has blocky structure and is slightly acid. The subsoil is about 23 inches thick and consists of black to very dark gray silty clay to heavy silty clay loam. It has prismatic structure and is neutral to mildly alkaline in reaction. The underlying material is grayish-brown heavy silt loam that is massive and is mildly alkaline.

Ditches and tile drains have been used to improve the natural drainage of these soils. In most places drainage is now as good as that of some of the soils that have always had better natural drainage. In some areas, however, additional drainage is needed. These soils have moderately slow or slow permeability. Therefore, the tile laterals need to be spaced at closer intervals than those in the Virden soils. The content of organic matter is high, and the content of phosphorus and potassium is medium. Nevertheless, additional nitrogen, phosphorus, and potassium are generally needed. The reaction of these soils is generally medium to slightly acid in the upper part of the profile and neutral to mildly alkaline in the lower part. Where these soils have not received recent overwash, they are generally neutral to moderately alkaline throughout the profile.

Representative profile of Shiloh silt loam, overwash (500 feet north and 40 feet east of the SW. corner of NW40, NW160, sec. 23, T. 9 N., R. 2 W.):

A11—0 to 10 inches, recent wash of very dark grayish-brown (10YR 3/2) silt loam; friable to firm; medium acid to slightly acid; gradual, smooth boundary.

IIA12—10 to 18 inches, black (10YR 2/1) silty clay to heavy silty clay loam; prismatic structure breaking to strong, fine and medium, angular blocky structure; firm when moist, very sticky and very plastic when wet, and very hard when dry; slightly acid; gradual, smooth boundary.

IIB2—18 to 30 inches, black (10YR 2/1) silty clay; moderate, coarse, prismatic structure; friable to firm when moist, very sticky and very plastic when wet, and very hard when dry; many coarse pores that have perimeters of very dark brown (10YR 2/2); neutral; gradual, smooth boundary.

IIB3g—30 to 41 inches, very dark gray (10YR 3/1) heavy silty clay loam; weak, coarse, prismatic structure; firm when moist, very sticky and very plastic when wet, and very hard when dry; many coarse pores that have a perimeter of strong brown (7.5YR 5/8); mildly alkaline; clear, smooth boundary.

IICg—41 to 80 inches, grayish-brown (2.5Y 5/2) heavy silt loam; many, fine, prominent, yellowish-brown (10YR 5/8) mottles; massive; friable to firm when moist; slightly sticky and slightly plastic when wet; many coarse pores lined with very dark gray (10YR 3/1) and having a perimeter of yellowish red (5YR 5/8); few very dark gray (10YR 3/1) joint planes in upper part of horizon; many krotovinas, 1½ inches in diameter and filled with black (10YR 2/1) silty clay; mildly alkaline; clear, smooth boundary.

The texture of the A11 horizon ranges from silt loam to light silty clay, depending upon the amount of overwash.

Shiloh soils are dark colored to a greater depth than the Virden soils.

Shiloh silty clay loam (0 to 2 percent slopes) (138).—This soil has a profile like the one described for the series, except that it lacks the layer of overwash. Because of the rather fine texture of the surface layer, tillage is more difficult when the soil material is too wet or too dry than in nearby soils that have a silty surface layer. Fall plowing makes this soil more suitable for a seedbed than spring plowing. When this soil is plowed in fall, the clods are broken down during winter by alternate freezing and thawing and wetting and drying.

These soils are suited to corn, soybeans, wheat, and other crops commonly grown in the county. Some areas are somewhat wet, however, and would be improved by additional drainage. Both open ditches and tile drains can be used. (Management group IIw-1, woodland group 7)

Shiloh silt loam, overwash (0 to 2 percent slopes) (138+).—This soil has the profile described for the series. It is suited to corn, soybeans, wheat, and other crops commonly grown in the county, but it is wet in some places and would be improved by additional drainage. This soil is suitable both for open ditches and tile drains. A good seedbed can be prepared no matter whether this soil is plowed in fall or in spring. (Management group IIw-1, woodland group 7)

Sicily Series

Deep, moderately dark colored, moderately well drained soils that are nearly level are in the Sicily series. These soils have developed in loess under the influence of prairie and forest vegetation. They occur on the uplands between areas of soils that developed under prairie and soils that developed under forest.

In most places the surface layer is about 8 inches thick and consists of very dark grayish-brown silt loam that has granular structure and is neutral in reaction. The subsurface layer, about 3 inches thick, is brown silt loam that has platy structure and is slightly acid. The subsoil is about 35 inches thick and is mostly dark yellowish-brown to light brownish-gray silty clay loam. It has subangular blocky or prismatic structure and is strongly acid to slightly acid. The underlying material is grayish to brownish silt loam that is massive and is neutral in reaction.

Sicily soils have moderate to moderately slow permeability and high available moisture capacity. Except where lime has been added to the plow layer, they are medium acid to strongly acid. These soils have a medium content of organic matter, nitrogen, phosphorus, and potassium. They are suitable for corn, soybeans, wheat, clover, alfalfa, and other crops commonly grown in the county.

Representative profile of a Sicily silt loam (594 feet north and 126 feet east of the SE. corner of NW160, sec. 19, T. 11 N., R. 5 W.):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—8 to 11 inches, brown (10YR 5/3) silt loam; common, fine, distinct, very dark grayish-brown (10YR 3/2) mottles and a few, fine, faint, dark-brown to brown (7.5YR 4/4) mottles; weak, thin, platy structure breaking to moderate, fine, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

B1t—11 to 16 inches, dark yellowish-brown (10YR 4/4) heavy silt loam to light silty clay loam; common, fine, distinct, pale-brown (10YR 6/3) mottles; weak to moderate, fine, subangular blocky structure; peds in lower part are coated with grayish-brown (10YR 5/2) to brown (10YR 5/3) clay films; when dry, the ped surfaces are coated with light gray (10YR 7/1); friable to firm; strongly acid; clear, smooth boundary.

B21t—16 to 26 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; many, fine, faint, brown (10YR 5/3) mottles and a few, fine, distinct, grayish-brown (10YR 5/_) mottles; weak, medium, prismatic structure breaking to strong, medium, subangular blocky structure; prisms coated with grayish brown (10YR 5/2) when moist and with white (10YR 8/1) when dry; thick, brown to dark-brown (10YR 4/3) clay films on the ends of prisms and on the finer blocks; firm; black iron manganese concretions; strongly acid; clear, smooth boundary.

B22t—26 to 37 inches, light brownish-gray (10YR 6/2) silty clay loam; many, fine, prominent, yellowish-brown (10YR 5/4 to 5/8) mottles; moderate, medium and coarse, prismatic structure breaking to coarse angular blocky structure; prisms almost completely coated with dark-gray (10YR 4/1) clay films; firm; many fine veins lined with very dark grayish brown (10YR 3/2); few, soft, black iron concretions; strongly acid to medium acid; diffuse, smooth boundary.

B3t—37 to 46 inches, light brownish-gray (10YR 6/2) light silty clay loam; many, medium, prominent, yellowish-brown (10YR 5/4 to 5/8) mottles; weak, coarse, angular blocky structure; dark-gray (10YR 4/1) clay films on the peds; friable; many fine veins lined with dark gray (10YR 4/1); medium acid to slightly acid; diffuse, smooth boundary.

C1—46 to 53 inches, gray to light-gray (10YR 6/1) silt loam; nearly massive; friable; a few fine veins lined with dark gray (10YR 4/1); neutral; clear, smooth boundary.

C2—53 to 68 inches, brown (7.5YR 5/2) silt loam; many, coarse, distinct, dark-brown to brown (7.5YR 4/4) mottles; neutral.

The Sicily soils are better drained than the Clarksdale soils. They have a lighter colored surface layer and subsurface layer than the Harrison soils.

Sicily silt loam, 2 to 4 percent slopes (258B).—This gently sloping soil is on ridges and in areas adjacent to drainageways. Its profile is the one described for the series.

This soil is used mainly for corn, soybeans, and other crops commonly grown in this county. It is well suited to those crops, but proper fertilization is needed. If field crops are grown regularly, such practices as terracing and contour tillage are needed to help control erosion. Where these practices are used, the cropping system needs to include wheat or oats and a catch crop grown every fourth year. If no erosion control practices are used, a suitable cropping system is one in which this soil is kept in meadow nearly half the time. (Management group IIe–1, woodland group 1)

Sicily silt loam, 4 to 7 percent slopes, eroded (258C2).—This sloping soil is in areas adjacent to drainageways. Its surface layer is thinner than the one in the profile described for the series. The plow layer is very dark grayish-brown silt loam and consists of a mixture of material from the surface layer and the subsurface layer. In places the plow layer contains small lumps of yellowish-brown material from the subsoil that have been mixed into it by tillage.

Included with these soils in mapping were areas of soils that have a subsoil developed in glacial till, and other areas of soils that developed entirely in glacial till. These included soils are on the lower parts of the slopes, adjacent to the smaller streams. Also included were some areas in which the plow layer consists mainly of material from the subsoil. None of the areas of included soils were large enough to be shown separately on the soil map.

Runoff is more extensive than on the other Sicily soils. The amount of moisture held available to plants is also smaller.

This soil is suited to corn, soybeans, and other crops commonly grown in the area, and it is used mainly for those crops. Good response is received if fertilizer is applied. Also, management practices, such as contour tillage and terracing, are needed that help to control erosion. Where these practices are used, a cropping system in which meadow crops are grown one-fourth of the time is suitable. If no erosion control practices are used, a suitable cropping system is one in which meadow crops are grown one-half the time. (Management group IIe–2, woodland group 1)

Starks Series

Soils of the Starks series are nearly level or gently sloping and are deep, light colored, and somewhat poorly drained. They have developed in silty alluvial deposits on stream terraces and alluvial fans in the valleys of the major streams throughout the county. The original cover was a forest of hardwoods.

In most places the surface layer is about 8 inches thick and consists of dark grayish-brown silt loam that has granular structure and is neutral in reaction. The subsurface layer, about 2 inches thick, is brown silt loam that has subangular blocky structure and is strongly acid to medium acid in reaction. The subsoil, about 24 inches thick, is brown in the upper part and gray in the lower part. It has a texture of silty clay loam, generally has subangular blocky and blocky structure, and is slightly acid to moderately alkaline. The underlying material is gray silt loam that is massive and is moderately alkaline.

Starks soils have moderate or moderately slow permeability and high available moisture capacity. Their content of organic matter and phosphorus is low, and their content of potasium is medium. In most places these soils are higher than the flood plain, but they are flooded in places for short periods when the level of the water is unusually high.

Representative profile of Starks silt loam (828 feet south and 302 feet west of the NE. corner of SE160, sec. 24, T. 8 N., R. 5 W.):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—8 to 10 inches, brown (10YR 5/3) silt loam; weak, fine, subangular blocky structure; friable; strongly acid to medium acid; clear, smooth boundary.

B1t—10 to 14 inches, brown (10YR 5/3) light silty clay loam; few, fine, faint, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/8) mottles; moderate, fine, subangular blocky structure; thin clay films on the peds; friable; slightly acid; clear, smooth boundary.

B2t—14 to 24 inches, brown (10YR 5/3) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/8) mottles and common, medium, faint, light brownish-gray (10YR 6/2) mottles; medium, coarse, prismatic structure breaking to moderate, fine and medium, angular block structure; prisms coated with grayish-brown (10YR 5/2) clay films; some thin films are on the blocky peds; firm; mildly alkaline; gradual, smooth boundary.

B3t—24 to 34 inches, gray (2.5Y 5/1) silty clay loam; many, medium, prominent, yellowish-brown (10YR 5/4 to 5/8) mottles; weak, medium, angular blocky structure; many, moderately thick, grayish-brown (2.5Y 5/2) clay coatings; friable; moderately alkaline; gradual, smooth boundary.

C—34 to 68 inches, gray (10YR 5/1) silt loam; many, medium, prominent, yellowish-brown (10YR 5/4 to 5/8) mottles; massive; friable; few, moderately thick, gray (5Y 5/1) clay films in cracks; moderately alkaline.

The A horizon ranges up to 24 inches in thickness. In some nearly level areas, the B horizons are more grayish than the ones described. The B3t horizon is more alkaline than the B3t horizon in Starks soils in other counties, and the B horizons do not extend to so great a depth. In other counties the B horizons are generally acid throughout and extend to a depth of about 48 inches. In places the B horizons are coarser textured than the ones described. In many areas small amounts of sand and small pebbles are mixed with the soil material throughout the profile.

Starks soils are not so well drained as the Camden soils. They have less clay in the subsoil than the Stoy soils.

Starks silt loam (132).—This nearly level soil is the only one of the Starks series mapped in Montgomery County. It has the profile described for the series. This soil is well suited to corn, soybeans, wheat, and other crops commonly grown in the county. (Management group IIe–4, woodland group 5)

Stoy Series

Somewhat poorly drained, light-colored, nearly level and gently sloping soils that have developed in loess are in the Stoy series. These soils are on ridgetops in the parts of the county that were originally under forest.

In most places the surface layer is about 3 inches thick and consists of very dark grayish-brown silt loam that has granular structure and is medium acid to slightly acid. The upper part of the subsurface layer is about 7 inches thick and consists of pale-brown silt loam that has platy or blocky structure and is very strongly acid. The lower part is about 4 inches thick and consists of pale-brown heavy silt loam that has subangular blocky structure and is extremely acid to very strongly acid. The subsoil is about 37 inches thick and is mostly brownish in the upper part and gray in the lower part. It has a texture of silty clay loam, generally has subangular blocky and blocky structure, and is extremely acid to very strongly acid. The underlying material is gray heavy silt loam that is massive and is very strongly acid.

Stoy soils are slowly permeable when wet and have medium to high available moisture capacity. They are low in content of organic matter, nitrogen, and phosphorus and low to medium in content of potassium. Reaction is very strongly acid to extremely acid.

Representative profile of a Stoy silt loam (200 feet south and 420 feet west of the NE. corner of NW40, SW160, sec. 17, T. 8 N., R. 4 W., or north of road and 294 feet east of the woods boundary):

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; medium acid to slightly acid; abrupt, smooth boundary.

A21—3 to 10 inches, pale-brown (10YR 6/3) silt loam; moderate, thin, platy structure; friable; fine iron-manganese concretions; very strongly acid; clear, smooth boundary.

A22—10 to 14 inches, pale-brown (10YR 6/3) heavy silt loam; moderate, medium, subangular blocky structure; many white silt coatings on the peds; friable; fine iron-manganese concretions; extremely acid to very strongly acid; clear, smooth boundary.

B1t—14 to 17 inches, yellowish-brown (10YR 5/4) light silty clay loam; common, fine, distinct, strong-brown (7.5YR 5/6) mottles in ped interiors; strong, fine and medium, subangular blocky structure; many white silt coatings on the peds; friable; fine iron-manganese concretions; extremely acid to very strongly acid; clear, smooth boundary.

B21t—17 to 23 inches, medium silty clay loam that has mixed colors of yellowish red (5YR 5/6 to 5/8), strong brown (7.5YR 5/6 to 5/8), and light brownish gray (10YR 6/2); strong, fine and medium, subangular blocky structure; firm; light-gray silt grains that are prominent when this soil material is dry completely coat the vertical cleavage planes and occupy patches on the horizontal planes; thin clay films underlie the silty coatings; ped exteriors are predominantly light brownish gray (10YR 6/2); extremely acid to very strongly acid; clear, smooth boundary.

B22t—23 to 30 inches, light brownish-gray (2.5Y 6/2) heavy silty clay loam; many, fine to medium, prominent, strong-brown (7.5YR 5/6 to 5/8) mottles; weak, coarse, prismatic structure breaking to moderate, medium, angular blocky structure; continuous clay films on the peds; firm; extremely acid to very strongly acid; clear, smooth boundary.

B23t—30 to 40 inches, same as B22t horizon, except that the texture is medium silty clay loam and the reaction is very strongly acid.

B3x—40 to 51 inches, gray to light-gray (10YR 6/1) light silty clay loam; many, fine to medium, yellowish-brown (10YR 5/6 to 5/8) mottles; weak, medium and coarse, angular blocky structure; firm; very strongly acid; clear, smooth boundary.

Cx—51 to 58 inches, gray (N 6/0) heavy silt loam; few, fine, prominent, yellowish-brown (10YR 5/6 to 5/8) mottles; massive; friable; very strongly acid.

The characteristics of the Stoy soils are fairly uniform, except that drainage, within the drainage class, varies to some extent. The profile described is in an area where drainage is better than in some other places. Where drainage is rather poor, the boundary between the A22 horizon and the B1t horizon is more abrupt than that in the profile described.

In many places it is questionable whether the B3x horizon is dense enough and near enough to being impermeable to really be classed as a fragipan. That horizon is more distinct in the better drained areas than in areas where drainage is poorer, and it is absent in most of the more poorly drained areas. In the better drained areas, the Stoy soils have characteristics somewhat similar to those of the Hosmer soils, and in the more poorly drained areas, they have characteristics somewhat similar to those of the Weir soils. In general, they are not so well drained as the Hosmer soils but are better drained than the Weir.

Stoy silt loam, 0 to 2 percent slopes (164A).—This soil has the profile described for the series. It is suited to corn, soybeans, wheat, and other crops commonly grown in the county. Adequate fertilization is needed, however, because natural fertility is low.

This soil is usually not plowed in fall, for the soil material tends to run together and becomes too compact for a good seedbed before planting time in spring. Tillage is easy, but excessive tillage tends to make this soil too compact to absorb moisture readily. (Management group IIw–2, woodland group 3)

Stoy silt loam, 2 to 4 percent slopes (164B).—In small areas of this soil, the surface layer is thinner than the one in the profile described for the series. Erosion is a hazard, and natural fertility is low.

Where contour tillage and terracing are used to control erosion, a cropping system in which meadow crops are grown one-fourth of the time helps to protect this soil.

Where neither of these practices is used, a cropping system in which meadow crops are grown one-half the time reduces losses from erosion. Proper fertilization is needed. Excessive tillage and plowing in fall tend to make this soil so compact that water is not absorbed readily. As a result, much of the water runs off and causes excessive erosion. (Management group IIe-4, woodland group 3)

Tamalco Series

In the Tamalco series are moderately dark colored, moderately well drained, gently sloping or sloping soils that have developed in loess under the influence of prairie vegetation. These soils are on low ridges or knolls and in areas along drainageways that are cutting into areas of intermingled Cowden and Piasa soils. Some of the areas are large, but in many places these soils occur in small areas that are intermingled with areas of Oconee and Hoyleton soils. They are distinguished by their acid, reddish-brown upper subsoil and alkaline, gray lower subsoil. The lower subsoil has a high content of exchangeable sodium and is too dense and massive to be suitable for roots. Because roots do not extend into the lower part of the subsoil, the areas of this soil that are not eroded are considered to have only a moderately deep effective root zone. Those that are eroded are considered to have a shallow root zone.

In most places the surface layer is about 6 inches thick and consists of very dark grayish-brown silt loam. It has platy structure and is very strongly acid. The subsurface layer, about 3 inches thick, is brown to dark-brown silt loam that has platy structure and is very strongly acid. Beneath the subsurface layer is a layer, about 3 inches thick, of brown light silty clay loam that has granular structure and is very strongly acid to strongly acid. The upper part of the subsoil is about 6 inches thick and consists of reddish-brown silty clay. It has prismatic or blocky structure and is strongly acid. The lower part of the subsoil, about 18 inches thick, is pale-brown to gray silty clay loam to silt loam. It has blocky structure and is mildly alkaline to moderately alkaline. The underlying material is light brownish-gray silt loam. It has blocky structure or is massive and is moderately alkaline.

The lower part of the subsoil is very slowly permeable, and available moisture capacity is medium to low. The content of organic matter, nitrogen, phosphorus, and potassium is low. Reaction is variable in the plow layer, but the upper part of the subsoil is strongly acid. The lower part of the subsoil contains excessive amounts of exchangeable sodium and is moderately alkaline. Because of the alkaline subsoil, not enough phosphorus and potassium are likely to be available to plants. Trees either do not grow on these soils, or they make only poor growth.

Representative profile of a Tamalco silt loam (767 feet west and 78 feet south of the NE. corner of NW40, NE160, sec. 26, T. 9 N., R. 4 W.; laboratory data for this profile are given in the section "Laboratory Data for Selected Soil Profiles"):

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, platy structure; friable; very strongly acid; abrupt, smooth boundary.

A2—6 to 9 inches, brown to dark-brown (10YR 4/3) silt loam; few, fine, prominent, reddish-brown (2.5YR 4/4) mottles; weak, thin, platy structure; friable; very strongly acid; abrupt, smooth boundary.

B&A—9 to 11 inches, brown (10YR 5/3) light silty clay loam; common, fine, prominent, reddish-brown (2.5YR 4/4) mottles; moderate, medium and coarse, granular structure; when dry, peds have light-gray (10YR 7/1) coatings; firm to friable; very strongly acid to strongly acid; abrupt, smooth boundary.

B21t—11 to 17 inches, reddish-brown (5YR 4/4) silty clay; moderate, fine and medium, prismatic structure breaking to moderate, fine, angular blocky structure; dark-brown (7.5YR 3/2) clay films; very firm; strongly acid; abrupt, smooth boundary.

B22t—17 to 28 inches, pale-brown (10YR 6/3) silty clay loam; many, fine, faint, brown (10YR 5/3) mottles; a few, fine, faint, light brownish-gray (10YR 6/2) mottles; and a few, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, fine and medium, angular blocky structure; firm; very dark grayish-brown (10YR 3/2) fillings in root channels; mildly alkaline; clear, smooth boundary.

B3t—28 to 35 inches, gray to light-gray (10YR 6/1) silt loam; many, medium, prominent, yellowish-brown (10YR 5/6) mottles and a few, fine, prominent, black (10YR 2/1) mottles; coarse angular blocky structure, with some grayish-brown (10YR 5/2) material filling the cracks; friable; moderately alkaline; clear, smooth boundary.

C—35 to 42 inches, light brownish-gray (10YR 6/2) silt loam; many, medium, prominent, strong-brown (7.5YR 5/6) mottles and a few, fine, prominent, black (10YR 2/1) mottles; weak, coarse, angular blocky structure to massive; friable; moderately alkaline; gradual, smooth boundary.

IIA1b—42 to 54 inches, grayish-brown (10YR 5/2) gritty silt loam; many, medium, prominent, brown to dark-brown (7.5YR 4/4) mottles and a few, fine, prominent, black (10YR 2/1) mottles; massive; friable; moderately alkaline; clear, smooth boundary.

IIBb—54 to 60 inches, dark-brown to brown (7.5YR 4/4) loam; common, prominent, dark grayish-brown (10YR 4/2) mottles and a few, fine, prominent, black (10YR 2/1) mottles; massive; firm to friable; moderately alkaline.

Depth to the underlying glacial till ranges from 40 to 50 inches.

Tamalco soils occur with Oconee and Hoyleton soils but have a lighter colored, thinner surface layer and subsurface layer than those soils. Also, the upper part of their subsoil is reddish brown instead of brown or grayish brown. The lower part is more grayish than those of the Oconee and Hoyleton soils and is alkaline instead of acid. The Tamalco soils resemble the Walshville soils but have developed in loess instead of in glacial till.

Tamalco silt loam, 2 to 4 percent slopes (581B).—This gently sloping soil is on convex ridges and in areas adjacent to drainageways. It has the profile described for the series. The dominant slope is about 3 percent.

Included with this soil in mapping were some areas in which the upper part of the subsoil is acid, is brown instead of reddish brown, and is mottled with grayish brown. Also included were some areas in which the soils have slopes of less than 2 percent. Other inclusions consist of areas in which the surface layer is thinner than the one in the profile described for the series.

Except in small, localized spots that are seepy, wetness is not a hazard to crops grown on this Tamalco soil. The ability to supply moisture to growing plants, however, is limited by the density of the lower part of the subsoil. A shortage of water generally reduces yields, except in years when the amount of moisture received is most favorable for the growth of plants.

This soil is only moderately well suited to the crops commonly grown in the county, even though good management is practiced and adequate fertilizer is applied. It is better suited to small grains than to corn and soybeans, however, because small grains mature early in summer when the soil still supplies enough moisture for crops. A shortage of moisture late in summer and in fall generally damages corn and soybeans. Excessive tillage causes a breakdown in structure in the plow layer of this soil, which, in turn, makes the seedbed cloddy. Where the plow layer is cloddy, water often remains between the clods for long periods.

This soil is used mainly for field crops and meadow. Protecting it from erosion is important because the alkaline lower subsoil is not productive. Where such practices as terracing and contour tillage are used to control erosion, a cropping system in which meadow crops are grown about two-fifths of the time protects this soil. If no erosion control practices are applied, this soil needs to be kept in meadow most of the time, though a row crop may be grown occasionally. (Management group IIIe–3, woodland group 7)

Tamalco silt loam, 2 to 4 percent slopes, eroded (581B2).—This gently sloping soil is on convex ridges and in areas adjacent to drainageways. Its surface layer is thinner than the one in the profile described for the series. The plow layer is brown silt loam that has lumps of material from the subsoil mixed into it in many places. Included in mapping were some areas in which the plow layer consists mainly of material from the subsoil.

Except in small, localized spots that are seepy, wetness is not a hazard to crops grown on this Tamalco soil. The capacity to supply moisture to growing plants, however, is limited by the density of the lower part of the subsoil. A shortage of moisture reduces yields, except in years when the amount of moisture received is most favorable for the growth of plants.

This soil is only moderately well suited to the crops commonly grown in the county, even though good management is practiced and adequate fertilizer is applied. It is better suited to small grains than to corn and soybeans because small grains mature early in summer when the soil still supplies enough moisture for crops. A shortage of moisture late in summer and in fall generally damages corn and soybeans. Excessive tillage causes a breakdown in the structure of the plow layer, which in turn, makes the seedbed cloddy. Where the plow layer is cloddy, water often remains between the clods for long periods.

This soil is used mainly for field crops and meadow. Protecting it from further erosion is important because the alkaline material in the lower part of the subsoil is not productive. Where such practices as terracing and contour tillage are used to control erosion, a cropping system in which meadow crops are grown about two-fifths of the time reduces losses of soil material. If no erosion control practices are used, this soil needs to be kept in meadow most of the time, though a row crop may be grown occasionally. (Management group IIIe–3, woodland group 7)

Tamalco silt loam, 4 to 7 percent slopes, eroded (581C2).—This sloping soil is on knolls or in areas along drainageways. It has a thinner surface layer than the one in the profile described for the series. The plow layer is brown silt loam that has lumps of material from the subsoil mixed with the material from the surface layer. Included in mapping were some severely eroded areas in which the plow layer consists mainly of subsoil material that is sticky when wet.

This soil contains many small, localized seepy spots. The capacity to supply moisture to growing plants, however, is limited by the density of the lower part of the subsoil. Loss of most of the surface layer through erosion has reduced the capacity to store water. The lower part of the subsoil is too dense for roots to derive much water from that source. Also, more water runs off this soil and less soaks in than in areas where the slopes do not exceed 4 percent. A shortage of water reduces yields, except in years when the amount of moisture received is most favorable for the growth of plants.

This soil is only moderately well suited to poorly suited to the crops commonly grown in the county, even though good management is practiced and adequate fertilizer is applied. It is suited mostly to meadow but can be used, to a limited extent, for field crops. Pasture and hay are the main uses. This soil is better suited to small grains than to corn and soybeans because small grains mature early in summer when the soil still supplies enough moisture for crops. A shortage of moisture late in summer and in fall generally damages corn and soybeans. Excessive tillage causes a breakdown in the structure of the plow layer, which, in turn, makes the seedbed cloddy. Where the plow layer is cloddy, water often remains between the clods for long periods.

Protecting this soil from further erosion is important because the alkaline lower part of the subsoil is not productive. Where such practices as terracing and contour tillage are used, a cropping system in which meadow crops are grown more than half the time helps to control erosion. If no erosion control practices are used, a suitable cropping system is one in which this soil is used for meadow almost continuously and a small grain is grown only occasionally. (Management group IIIe–3, woodland group 7)

Terril Series

Soils of the Terril series are dark colored and well drained. They developed in alluvium and are on alluvial fans and stream terraces in the valleys of the major streams throughout the county. The original cover was a mixture of grasses and bottom-land hardwoods.

In most places the surface layer is about 17 inches thick and consists of very dark grayish-brown, dark-brown, and black loam. It has granular or subangular blocky structure and is slightly acid to neutral in reaction. The subsoil, about 31 inches thick, is dark-brown heavy loam or loam that has subangular blocky structure and is slightly acid to neutral in reaction. The underlying material is dark-brown to brown loam that is massive and is slightly acid to neutral in reaction.

Terril soils are moderately permeable and have high available moisture capacity. They are medium in content of organic matter, nitrogen, phosphorus, and potassium, and are medium acid to mildly alkaline in reaction.

Representative profile of a Terril loam (540 feet east along center of road and 210 feet north of county highway bridge over Middle Fork Shoal Creek, in NE10, NW40, NE160, sec. 15, T. 8 N., R. 4 W.):

A11—0 to 10 inches, very dark grayish-brown (10YR 3/2) loam; weak, fine, granular structure; friable; slightly acid to neutral; clear, smooth boundary.

A12—10 to 13 inches, black (10YR 2/1) loam; moderate, fine, subangular blocky structure; friable; slightly acid to neutral; gradual, smooth boundary.

A3—13 to 17 inches, dark-brown (10YR 3/3) loam; moderate, fine, subangular blocky structure; slightly acid to neutral; gradual, smooth boundary.

B21—17 to 30 inches, dark-brown (10YR 3/3) heavy loam; moderate, medium, subangular blocky structure; discontinuous, thin, black (10YR 2/2) coatings of organic matter are on the peds and line the many small to medium-sized pores; firm; slightly acid to neutral; gradual, smooth boundary.

B22—30 to 42 inches, dark-brown (10YR 3/3) loam; weak to moderate, medium to coarse, subangular blocky structure; discontinuous, very dark grayish-brown (10YR 3/2) coatings of organic matter are on the peds and line the pores; firm to friable; slightly acid to neutral; gradual, smooth boundary.

B3—42 to 48 inches, brown to dark-brown (10YR 4/3) loam; weak to coarse, subangular blocky structure; few, very dark grayish-brown (10YR 3/2) coatings of organic matter are on the peds and line the pores; friable; slightly acid to neutral; gradual, smooth boundary.

C—48 to 60 inches, dark-brown to brown (7.5YR 4/4) loam; massive; friable; slightly acid to neutral.

In most places the texture of the solum is loam, but it approaches fine sandy loam or silt loam. In many places small pebbles are scattered throughout the profile.

Terril soils are better drained than Nokomis soils. They are darker colored than Camden soils.

Terril loam, 2 to 5 percent slopes (587B).—This is the only Terril soil mapped in Montgomery County. Its profile is the one described for the Terril series. This soil is gently sloping and is on alluvial fans and stream terraces, at a slightly higher elevation than the soils on bottom lands. Ordinarily, flooding is not a hazard, but there are severe floods that do not last long. The dominant slopes are about 4 percent, but the slopes are as much as 7 percent in some areas. The average length of slopes is about 150 feet. Included with this soil in mapping were some areas in which stratified sand and silt are in the lower part of the profile.

This Terril soil is suited to field crops, hay, and pasture, and it is also suitable for trees. Most of the acreage is in corn and soybeans. The soil is moderately well suited or well suited to the crops commonly grown in the county. Proper fertilization and good management are needed, however, and in places diversion ditches are also needed. They keep runoff from higher lying soils from spreading out over this soil and causing damage.

Though this soil has gentle slopes, erosion is not a serious hazard. Contour tillage and terracing make runoff slow enough so that corn can be grown year after year without causing serious erosion. If contour tillage is practiced, using this soil for wheat or oats and growing a catch crop every fourth year will help to control erosion. (Management group IIe–1, woodland group 7)

Velma Series

In the Velma series are loamy, dark-colored, moderately well drained soils that have developed in glacial till under prairie or mixed prairie and forest vegetation. These soils are sloping to strongly rolling. They occur along the edges of small valleys that have been formed by headwater erosion and entrenchment of streams.

In most places the surface layer is about 14 inches thick and consists of very dark brown loam. It has granular structure and is strongly acid to medium acid. Beneath the surface layer is a layer, about 4 inches thick, of very dark brown and dark yellowish-brown heavy loam that has subangular blocky structure and is medium acid. The subsoil, about 28 inches thick, is dark-brown to gray clay loam that has subangular blocky and blocky structure and is strongly acid to slightly acid. The underlying material is gray clay loam that is massive and is neutral in reaction.

Included with these soils in mapping, especially on the upper parts of the slopes, are small areas of silty soils that developed in loess rather than in glacial till.

In general, permeability is moderate, but it is slow in some severely eroded areas. The available moisture capacity is moderate to high. The content of organic matter, nitrogen, and potassium is medium, and the content of phosphorus is low. Erosion is a serious hazard and is especially harmful because it makes these soils less suitable for crops. Except where the plow layer has received lime, the reaction is medium acid to strongly acid.

Representative profile of a Velma loam (along west right-of-way of road, 444 feet south of the NE. corner, SE40, NE160, sec. 20, T. 10 N., R. 4 W.):

A1—0 to 14 inches, very dark brown (10YR 2/2) loam; strong, fine and medium, granular structure; friable; strongly acid to medium acid; clear, smooth boundary.

A3—14 to 18 inches, very dark brown (10YR 2/2) and dark yellowish-brown (10YR 4/4) heavy loam; moderate fine and medium, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B21t—18 to 24 inches, brown to dark-brown (10YR 4/3) light clay loam; many, fine, faint, very dark grayish-brown (10YR 3/2) mottles; moderate, medium, subangular blocky structure, with dark grayish-brown (10YR 4/2) coatings on the peds; friable; medium acid.

B22t—24 to 36 inches, brown (10YR 5/3) clay loam; many, fine, prominent, brown to dark-brown (7.5YR 4/4) mottles and a few, fine, prominent, dark reddish-brown (5YR 3/2) mottles; moderate, medium and coarse, subangular blocky structure, with clay coatings on the peds; black iron concretions; strongly acid to medium acid; gradual, smooth boundary.

B3t—36 to 46 inches, gray (10YR 5/1) clay loam; many, medium, prominent, yellowish-brown (10YR 5/6) mottles; weak, coarse, angular blocky structure; firm; medium acid to slightly acid; clear, smooth boundary.

C—46 to 70 inches, gray (10YR 5/1) clay loam; many, medium, prominent, yellowish-brown (10YR 5/6) mottles; massive; firm; neutral.

In many areas the A1 horizon is very dark grayish-brown (10YR 3/2). The combined thickness of the A horizons ranges from 7 to 18 inches.

Velma soils have a darker colored surface layer than Hickory soils and lack the subsurface layer that is characteristic of Hickory soils. They are more deeply leached than the Hennepin soils. Unlike the Harrison soils, the Velma soils have developed in glacial till.

Velma loam, 4 to 7 percent slopes (250C).—This sloping soil is in areas adjacent to drainageways. In general, its profile is similar to the one described for the series, but the surface layer ranges from 7 to 18 inches in thickness.

This soil is well suited to the crops commonly grown in the county, but proper fertilization is needed. Erosion control practices, such as terracing and contour tillage, are necessary if cultivated crops are grown. Where those practices are used, a cropping system in which meadow crops are grown 2 years out of 5 is suitable. If no practices are used to protect this soil, a row crop can be grown only occasionally without losses from erosion. (Management group IIe–2, woodland group 7)

Velma loam, 4 to 7 percent slopes, eroded (250C2).—This sloping soil generally occurs in areas adjacent to drainageways. Its surface layer is thinner than the one in the profile described for the series. The plow layer is very dark grayish-brown loam but has a few lumps of material from the subsoil mixed into it.

Included with this soil in mapping were a few areas in which the plow layer consists mainly of material from the subsoil. Those areas were too small to be shown separately on the soil map.

This Velma soil is moderately well suited or well suited to the crops commonly grown in the county, but proper fertilization is needed. Cultivated crops can be grown, but such practices as contour tillage and terracing are needed. Where those practices are used, growing meadow crops 2 years out of 5 helps to protect this soil. If no erosion control practices are used, a row crop should be grown only occasionally. (Management group IIe–2, woodland group 7)

Velma loam, 7 to 12 percent slopes (250D).—This is a rolling soil in areas adjacent to the large drainageways. It has a profile similar to the one described for the series, except that the surface layer is 7 to 14 inches thick.

This soil is suited to the crops commonly grown in the county. Proper fertilization and practices that control erosion are needed, however, if cultivated crops are grown. If contour tillage is practiced, and if this soil is terraced, a cropping system in which meadow crops are grown two-thirds of the time is necessary for controlling erosion. If no erosion control practices are used, this soil is suited primarily to pasture and hay. (Management group IIIe–1, woodland group 7)

Velma loam, 7 to 12 percent slopes, eroded (250D2).—The surface layer of this soil is thinner than the one in the profile described as representative for the series. This is a rolling soil, adjacent to large drainageways. The plow layer is very dark grayish-brown loam that has a few lumps of subsoil mixed into it. In some areas too small to be shown on the map, the plow layer consists principally of material from the subsoil.

Included with this soil in mapping was a small area of a soil southeast of Hillsboro that is underlain by very clayey glacial deposits. This included soil has slopes of 7 to 12 percent.

This Velma soil is suited to a row crop grown occasionally if terraces, contour tillage, and similar erosion control practices are used. It is suitable for pasture or hay, but good fertilization practices are needed. (Management group IIIe–1, woodland group 7)

Velma loam, 12 to 18 percent slopes (250E).—This soil is in areas adjacent to large drainageways. It is rolling to moderately steep. The surface layer ranges from 7 to 14 inches in thickness.

This soil is suited mainly to hay crops, pasture, or trees. Its strong slopes and susceptibility to erosion make it unsuitable for row crops. (Management group IVe–1, woodland group 7)

Velma-Walshville complex, 4 to 7 percent slopes, eroded (996C2).—This soil complex is adjacent to drainageways. It is in the upper parts of the valleys of small streams in the central and southern parts of the county. The soils occur in such an intricate pattern that it was not feasible to show them separately on the soil map. They have developed under a cover of mixed forest and grasses.

Originally, these soils had a loamy, dark colored or moderately dark colored surface layer. Erosion has removed part of the original surface layer, however, and has left a surface layer that is lighter colored than the original one. The surface layer of the Walshville soil is somewhat lighter colored than that of the Velma soil. In many places after a heavy rain, the Walshville soil in a recently plowed field can be distinguished from the Velma soil by the lighter color of its surface layer. In many areas these two soils are of about equal extent, but the Velma soil is more extensive than the Walshville in some places. The extent of each varies considerably, however, within any one area. The profile of the Velma soil is like the one described for the Velma series. A detailed profile of the Walshville soil is described under the Walshville series.

Included with these soils in mapping were small areas of soil that is finer textured and more poorly drained than these soils and that has a profile superimposed on an older profile. The older profile is that of a soil that formed under different conditions than those active at the present time.

Because erosion has removed much of the porous surface layer, less water enters these soils and more water runs off than in areas that are not eroded. In most places the Walshville soil is severely eroded but the Velma soil still retains part of its dark-colored surface layer. The Walshville soil is less well suited to crops than the Velma. In some areas, particularly in areas where the Walshville soil is especially eroded, these soils do not support plant growth of any consequence. Even where the soils are properly fertilized and have received the best management feasible, they are only poorly suited to the crops commonly grown in the county. Its alkaline subsoil makes the Walshville soil more difficult to fertilize properly than the adjacent Velma soil. Consequently, crops growing on the Walshville soil often show deficiencies in plant nutrients that are not apparent on the Velma soil. Also, the Velma soil has higher available moisture capacity than the Walshville because roots can penetrate to a greater depth.

The slopes are short, and as a result, erosion control practices are difficult to apply. Where such practices as terracing and contour tillage are used, however, a row crop can be grown occasionally. Even so, these soils are not well suited to row crops, because they have only a small supply of plant nutrients, have reduced available moisture capacity, and are harder to work than soils that are not eroded. (Management group IIIe–3, woodland group 7)

Velma-Walshville complex, 7 to 12 percent slopes, eroded (996D2).—This is a rolling soil adjacent to drainageways where erosion has been active. In small areas, mainly of the Walshville soil, all of the surface layer has been removed and the subsoil is exposed. Most of the slopes are short. The dominant slope is about 10 percent.

The Velma soil of this complex is less well drained than the typical Velma soils. In both the soils, the rate of infiltration is slower, the amount of runoff is greater, and the supply of plant nutrients is smaller than in less eroded Velma and Walshville soils. Also, the available moisture capacity is lower than in the less eroded soils because erosion has removed most of the fertile, porous surface layer.

Even though these soils are properly fertilized and are well managed, they are only moderately well suited to the crops commonly grown in the county. They are suitable for pasture and hay crops and are used mainly for those purposes, but they can also be used for wildlife and recreation. Row crops do not grow well and trees grow poorly, because of the alkaline subsoil of the Walshville soil. Practices are needed that provide protection from further erosion. (Management group IIIe–1, woodland group 7)

Virden Series

Deep, dark-colored soils that are nearly level and are poorly drained are in the Virden series. These soils are in broad swales, mainly in the northern part of the county.

In most places the surface layer is about 11 inches thick and consists of black silty clay loam that has granular structure and is slightly acid to mildly alkaline. Beneath the surface layer is a layer of black silty clay loam that is about 3 inches thick, has subangular blocky structure, and is neutral in reaction. The subsoil, about 39 inches thick, is very dark gray to grayish-brown and dark gray silty clay loam that has prismatic or blocky structure and is neutral to mildly alkaline in reaction. The underlying material is gray silt loam that is massive and is mildly alkaline.

Virden soils are naturally fertile and have high available moisture capacity. They are high in content of organic matter and nitrogen and medium in content of phosphorus and potassium. These soils are neutral in reaction and have moderately slow permeability. The silty clay loam in their surface layer makes them more difficult to till than associated Harrison and Herrick soils that have a surface layer of silt loam. If soil tilth deteriorates, grasses and legumes need to be included in the cropping system to help improve tilth.

Representative profile of Virden silty clay loam (100 feet north and 100 feet west of the SE. corner of sec. 11, T. 10 N., R. 5 W.):

A1—0 to 11 inches, black (10YR 2/1) silty clay loam; moderate, fine to medium, granular structure; firm when moist, very sticky and very plastic when wet; mildly alkaline; gradual, smooth boundary.

A3—11 to 14 inches, black (10YR 2/1) silty clay loam; moderate, fine, subangular blocky structure; firm when moist, very sticky and very plastic when wet; neutral; gradual, smooth boundary.

B1g—14 to 19 inches, very dark gray (10YR 3/1) silty clay loam; few, fine, distinct, gray (5Y 5/1) mottles; moderate, medium, blocky structure; firm when moist, very sticky and very plastic when wet; neutral; gradual, smooth boundary.

B21g—19 to 26 inches, gray (5Y 5/1) silty clay loam; many, fine, distinct, very dark gray (10YR 3/1) mottles; moderate, medium and fine, prismatic structure breaking to moderate, medium, blocky structure; continuous, very dark gray (10YR 3/1) coatings on the peds; firm when moist, very sticky and very plastic when wet; neutral; gradual, smooth boundary.

B22g—26 to 39 inches, grayish-brown (2.5Y 5/2) silty clay loam; many, fine, distinct, olive-brown (2.5Y 4/4) mottles; weak, coarse, prismatic structure; continuous, very dark gray (10YR 3/1) coatings on the peds and many root tracks on the clay films; firm when moist, very sticky and very plastic when wet; neutral; diffuse, smooth boundary.

B3g—39 to 53 inches, dark-gray (N 4/0) light silty clay loam; many, coarse, prominent, yellowish-brown (10YR 5/4 to 5/8) mottles; continuous, very dark gray (10YR 3/1) coatings on the peds; firm when moist, sticky and very plastic when wet; many fine pores lined with very dark gray (10YR 3/1); mildly alkaline; diffuse, smooth boundary.

Cg—53 to 60 inches, gray (N 5/0) silt loam; many, coarse, prominent yellowish-brown (10YR 5/4 to 5/8) mottles; massive; friable; many fine pores lined with very dark gray (10YR 3/1); mildly alkaline.

Virden soils occur with Herrick soils and Harrison soils but are more poorly drained than those soils. Also, they are finer textured than those soils and lack the A2 horizon that is typical in the profile of the Herrick soils.

Virden silty clay loam (0 to 2 percent slopes) (50).—This is the only Virden soil mapped in Montgomery County. It has the profile described for the series. Included in mapping were small areas of a soil that has a surface layer of heavy silt loam, and other areas of a soil that contains concretions of calcium carbonate that are mainly in the subsoil.

Drainage of this Virden soil has been improved by constructing drainage ditches and installing tile drains. Now, most areas are no wetter than areas of naturally better drained soils. The tile drains must be maintained, and sometimes they must be replaced to keep these soils adequately drained. Except in a few areas, this soil can be worked and crops can be planted as soon after rainy seasons as on better drained soils. Nearly all of the acreage is in corn, soybeans, and wheat, and this soil is well suited to those crops. It is usually plowed in fall, which permits the large clods to break down into a good seedbed before planting time in spring. (Management group IIw–1, woodland group 7)

Walshville Series

In the Walshville series are moderately deep, medium-textured, light-colored soils that are moderately well drained. These soils have developed in glacial till under a cover of mixed prairie and forest. They are characterized by a brown, acid upper subsoil and a gray lower subsoil that is alkaline in reaction, is high in exchangeable sodium, and restricts the development of roots. These soils are sloping to rolling and are adjacent to streams that are cutting into the uplands. They occupy small, scattered areas within larger areas of Velma soils.

In most places the surface layer is about 11 inches thick and consists of very dark grayish-brown silt loam that has granular structure and is strongly acid. The subsurface layer, about 3 inches thick, is mottled dark grayish-brown heavy silt loam that has subangular blocky structure and is strongly acid. To a depth of about 21 inches, the subsoil is dark-brown to brown heavy clay loam to silty clay loam that has blocky structure and is strongly acid. Below that depth, to a depth of about 46 inches, the subsoil is grayish-brown to gray clay loam that has blocky structure or is massive and is moderately alkaline. Beneath is gray to light-gray calcareous heavy loam.

Walshville soils have slow to very slow permeability and low available moisture capacity. Roots can penetrate their subsoil to only a limited depth.

Representative profile of a Walshville silt loam (180 feet north and 45 feet east of the SW. corner of NW160, sec. 33, T. 10 N., R. 5 W.):

A1—0 to 11 inches, very dark grayish-brown (10YR 3/2) heavy silt loam; weak, medium, granular structure; firm to friable; strongly acid; abrupt, irregular boundary.

A2—11 to 14 inches, dark grayish-brown (10YR 4/2) gritty, heavy silt loam; many, distinct, very dark grayish-brown (10YR 3/2) mottles; weak, very fine, subangular blocky structure; friable; strongly acid; abrupt, smooth boundary.

B21—14 to 21 inches, dark-brown to brown (7.5YR 4/4) heavy clay loam to silty clay loam; moderate, very fine and fine, blocky structure; firm; peds coated with reddish-brown (5YR 4/4) and dark grayish-brown (10YR 4/2) clay films; strongly acid; clear, smooth boundary.

B22—21 to 30 inches, grayish-brown (10YR 5/2) heavy clay loam; weak, coarse, blocky structure; firm; dark yellowish-brown (10YR 4/4) clay films on the surfaces of some peds; moderately alkaline; gradual, smooth boundary.

B31—30 to 46 inches, mixed gray (N 5/0), strong-brown (7.5YR 5/6 to 5/8), and some dark yellowish-brown (10YR 4/4) light clay loam; massive; friable; brown (7.5YR 5/2) clay films in the few cracks; lime concretions in the lower part; moderately alkaline; diffuse, smooth boundary.

B32—46 to 80 inches, gray to light-gray (N 6/0) heavy loam; many, coarse, prominent, strong-brown (7.5YR 5/6 to 5/8) mottles; brown (7.5YR 5/2) clay films in the few widely scattered joint planes; calcareous.

The surface layer of a typical Walshville soil contains enough sand to give it a gritty feel. The thickness of the various horizons varies considerably. In some areas the acid material above the alkaline part of the B horizons is 30 to 36 inches thick. Many areas are so eroded that the brown upper B horizons have been exposed, and material from those horizons is incorporated in the plow layer. In other areas the alkaline lower B horizons are exposed.

The Walshville soils are intermingled with areas of Velma soils in such an intricate pattern that it was not feasible to show these soils separately on the soil map. Therefore, they were mapped together as a soil complex.

The Walshville soils are similar to Tamalco soils but have developed in glacial till instead of in loess. Also, they have sandy and gravelly material throughout their profile that is lacking in the Tamalco soils.

Weir Series

In the Weir series are nearly level, light-colored, poorly drained soils that have developed in loess. These soils are in the part of the county that was originally under forest. Their original cover was a hardwood forest consisting of hickory and post oaks, blackjack oaks, and other kinds of oaks.

In most places the surface layer is about 8 inches thick and consists of dark grayish-brown silt loam that has granular structure and is slightly acid. The upper subsurface layer is about 4 inches thick and consists of gray silt loam that has platy structure and is strongly acid. The lower one is about 3 inches thick and consists of grayish-brown silt loam that also has platy structure but is very strongly acid to strongly acid. The subsoil, about 33 inches thick, is grayish-brown silty clay loam to silty clay that has blocky structure and is very strongly acid to slightly acid. The underlying material is gray to light-gray, massive silt loam that is medium acid to slightly acid.

Weir soils are slowly permeable when wet and are very strongly acid in areas that have not been limed. Though they have moderate to high available moisture capacity, yields are low in years when rainfull is limited. The content of organic matter, nitrogen, phosphorous, and potassium is low. If these soils are tilled when dry, they are quickly pulverized into dust. After heavy rains, they run together readily, and replowing is sometimes necessary to prepare a good seedbed.

Representative profile of Weir silt loam (894 feet southeast along the east right-of-way of the road from the NW. corner of SE160, sec. 24, T. 9 N., R. 5 W.):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; medium acid to slightly acid; abrupt, smooth boundary.

A21—8 to 12 inches, gray (10YR 5/1) silt loam that is light gray to gray (10YR 6/1) when dry; moderate, thin, platy structure; friable; strongly acid; clear, smooth boundary.

A22—12 to 15 inches, grayish-brown (10YR 5/2) silt loam that is light gray (10YR 7/1) when dry; moderate, thin, platy structure; friable; very strongly acid to strongly acid; abrupt, smooth boundary.

B21t—15 to 18 inches, grayish-brown (2.5Y 5/2) heavy silty clay loam; few, fine, prominent, strong-brown (7.5YR 5/8) mottles; moderate, fine, angular blocky structure; has light-gray (10YR 7/1) coatings on the structural aggregates when dry and has light brownish-gray (10YR 6/2) clay films on the structural aggregates; firm; very strongly acid; gradual, smooth boundary.

B22t—18 to 40 inches, grayish-brown (2.5Y 5/2) silty clay; few, fine, prominent, strong-brown (7.5YR 5/8) mottles; weak to moderate, coarse, angular blocky structure; firm; light brownish-gray (10YR 6/2) clay films on the structural aggregates; black iron concretions; very strongly acid to strongly acid; gradual, smooth boundary.

B3t—40 to 48 inches, grayish-brown (2.5Y 5/2) silty clay loam; few, medium, prominent, dark-brown to brown (7.5YR 4/4) mottles; weak, coarse, angular blocky structure; firm; light brownish-gray (10YR 6/2) clay films on the structural aggregates; medium acid to slightly acid; gradual, smooth boundary.

C—48 to 60 inches, gray to light-gray (N 6/0) silt loam; coarse, prominent mottles ranging from brown or dark brown (7.5YR 4/4) to dark red (2.5YR 3/6) in color; massive; friable; medium acid to slightly acid.

Weir silt loam (0 to 2 percent slopes) (165).—This soil has the profile described for the series. It is the only soil of the Weir series mapped in Montgomery County.

Draining excess water from this soil is difficult. Ditches are needed if water tends to remain on the surface after heavy rains. Tile drains do not function properly, because of the slow permeability of the subsoil. Even where this soil has been drained, it usually remains so wet until late in spring that plants do not grow well.

After plowing and the usual tillage have been completed, the plow layer tends to settle down in a compact mass that absorbs water only slowly. When the plow layer dries after a heavy rain, it is especially dense. Germinating plants are unable to penetrate the mass to break through to the surface. For good germination and good yields, tillage should be limited to the minimum necessary for preparing the seedbed.

This soil is better suited to wheat and soybeans than to corn. Alsike clover and ladino clover grown with tall fescue are well-suited meadow crops. Large amounts of fertilizer, frequently applied, are needed because of the low natural fertility. (Management group IIIw–1, woodland group 4)

Use and Management of Soils

The soils of Montgomery County are used mainly for cultivated crops and pasture. This section gives general information about managing the soils for these main purposes and also explains the capability classification used by the Soil Conservation Service to show the relative suitability of soils for various uses. It then groups the soils into management groups, gives facts about managing specific soils, and gives estimated yields under two levels of management. Finally, it gives facts about managing the soils for trees and for engineering purposes.

General Management of Soils Used for Cultivated Crops

Soils used for cultivated crops need management practices that protect them from erosion, that remove excess water without causing damage, that maintain good tilth, and that maintain or increase the supplies of plant nutrients. These same practices apply to all the soils in the county that are used for corn, soybeans, wheat, oats, red clover, alfalfa, tall fescue, bluegrass, lespedeza, and other commonly grown crops. Following is a brief discussion of these practices. More specific information about use and management of the soils is given under the appropriate management groups.

Controlling erosion.—Erosion damages a soil and leaves it less productive, and it also damages roads, drainage ditches, and channels by depositing soil material washed from higher lying soils. Many of the soils in Montgomery County are subject to erosion if they are cropped, and if precautions are not taken to protect them. Where the soils are protected by a cover of permanent grass or trees, losses from erosion are usually negligible.

Graded terraces are among the most effective means of controlling erosion in tilled fields, and many of them have been constructed. They are needed most on the long slopes of the Pike, Douglas, Harrison, Oconee, and Hoyleton soils because they intercept water and conduct it safely to a grassed waterway before it can cause erosion. Contour tillage is used with the terraces and is effective in controlling erosion on the Douglas, Pana, Harrison, and other gently sloping or sloping, permeable soils. On strongly sloping soils, keeping the rows level is more difficult and tilling on the contour is less effective than on less sloping soils. On some sloping soils, stripcropping has been used to some extent, but its use is not widespread.

A cropping system that includes meadow crops provides an effective method of controlling erosion. While the close-growing meadow crop covers the soil, it reduces the amount of erosion that takes place and it also improves soil tilth. More water enters a soil that is in good tilth than enters a soil that is in poor tilth, and less water runs off to cause erosion.

Keeping tillage to a minimum when preparing the seedbed increases the infiltration of water and is another effective means of reducing losses from erosion. Use of a herbicide often takes the place of several tillage operations, and it thus preserves the soil structure.

Good management of crop residue also protects the soils. Cornstalks shredded in fall, for example, provide the maximum amount of protection.

The hazard of erosion is serious where soils that are subject to erosion are plowed in fall and are left bare over winter. If fields are plowed in fall, a system for disposing of excess water should include the use of grassed waterways, weir dams, and similar devices that will remove excess water without damaging the soils.

Improving drainage.—Originally, many large areas of Virden, Harvel, and Shiloh soils, especially in the northern part of the county, were so poorly drained that crops could not be grown on them. Since that time, 42 drainage districts have been organized and many ditches have been dug to supply drainage. Drainage of most of the poorly drained soils, as well as drainage of many soils in areas outside those covered by the drainage districts, have been improved by installing tile drains.

The soils that formerly were wet are now among the most productive of the soils in the county. In some places, however, additional drainage is needed. Tile drains and open ditches would increase the returns from soils in those areas. Tile drains do not draw satisfactorily in some of the slowly permeable soils, such as the Cowden, Weir, and Cisne, or in very slowly permeable soils, such as the Piasa and Huey. Shallow open ditches can be used to remove water that remains on the surface of those soils after heavy rains.

Maintaining good tilth.—Maintaining good tilth is important, especially in steep soils that are farmed. Where a soil is in good tilth, more water enters it and less water runs off than where the tilth has deteriorated. If good tilth is maintained, erosion is less serious than where tilth has deteriorated, and more water is held available for crops.

Good tilth is necessary for the firm, granular seedbed that is especially needed for alfalfa, grass, and other small-seeded crops. Excessive plowing, disking, and harrowing tend to break down the tilth of the surface layer, particularly in the Cowden, Cisne, Weir, and other soils that have a silty texture. Tillage practices that require the least manipulation of the soil to make a suitable seedbed are the most desirable and the most profitable.

Meadow crops tend to cause aggregation of the soil particles, and thus they improve tilth. This is partly because meadow crops require no tillage and partly because soil bacteria readily act to decompose the organic matter in residue from sod crops. In addition, crops that form a sod provide a protective cover and further reduce erosion.

Maintaining fertility.—Soils of Montgomery County differ in reaction and fertility because of inherent differences and past management. Therefore, the soils need to be tested to determine the pH value, or reaction, and the amount of phosphorus and potassium available in the plow layer. A representative of the County Extension Service or of the University of Illinois College of Agriculture can give assistance in taking soil samples and in interpreting the results of the tests.

Tests to determine the amount of nitrogen in the soils are not suitable for appraising the amount of nitrogen fertilizer needed for the growth of a specific crop throughout an entire growing season. This is because the content of nitrogen varies widely in soils within a short period of time, depending upon the temperature, the amount of moisture, the amount of organic matter in the soil, and the kinds of plants growing on the soil. In many soils of Montgomery County, lack of nitrogen is the most limiting factor in obtaining good yields. Nitrogen should be added in commercial fertilizer, manure, legumes, and crop residue.

General Management of Soils Used for Pasture

About 17 percent of the total acreage in the county is used for pastures that are more or less permanent. Most of the pastures are on the rolling to very steep soils and on the adjacent small bottoms and ridgetops in areas of less sloping soils. The areas on the bottoms and ridgetops are generally so small and narrow that tilling them would not be profitable.

The principal plants used for pasture are bluegrass, tall fescue, and lespedeza, but weeds, brush, sedges, and other undesirable pasture plants are predominant in many places. The pastures are commonly grazed year after year for several decades without being properly fertilized and well managed. Consequently, the returns are low. Testing the soils and then applying plant nutrients or amendments suitable for alfalfa and clover is desirable. After that, a grass-legume mixture should be seeded. Regular additions of lime, phosphorus, and potassium are necessary to keep the pastures productive, but eventually, the legumes die out. Then, it is necessary to renovate and reseed to legumes or to apply a nitrogen fertilizer annually to keep the grasses productive.

Planning and managing a pasture is more effective if the characteristics of the soils are considered. For example, the kinds of grasses and legumes seeded in a pasture of nearly level, productive soils that are to be grazed for only a short time may not be the most desirable for seeding on steep soils of low productivity on which the pasture is to remain suitable for grazing for 4 or 5 years or as long as possible.

Pasture management for strongly sloping to steep soils.—The strongly sloping to steep Hickory, Negley, Hennepin, and Velma soils of management groups IVe–1, VIe–1, and VIIe–1 are the soils used most extensively for pasture. The steep slopes and small streams make difficult the tillage needed for seeding and applying fertilizer in many areas of these soils. In some places the soils are so steep that the same tools cannot be used for applying fertilizer and lime as are commonly used for applying fertilizer and lime in areas used for field crops. For this reason, pastures that will last for a long time should be established. Most areas of these soils are now covered with bluegrass, which makes a satisfactory cover but is less productive than tall fescue, orchardgrass, and bromegrass. Bromegrass may be less productive on these soils than on other soils, unless it is seeded as a companion crop with a legume or receives annual applications of nitrogen and other kinds of fertilizer.

Common lespedeza, Korean lespedeza, white clover, and yellow trefoil are the legumes that most commonly appear without seeding on the Hickory soils and on similar soils used for pasture. Common lespedeza and Korean lespedeza are annuals. They produce forage of good quality for only a short period during July through September, and this short season makes the total annual yield of forage low. White clover is not a dependable legume on these soils. It often appears spontaneously after a wet period but tends to disappear during the dry months.

These soils are not so well suited to alfalfa as are some other soils. The stand begins to thin out soon after the alfalfa is seeded, and it usually disappears within 5 or 6 years. Nevertheless, alfalfa is the most productive legume for seeding on these soils.

The best practice for seeding or reseeding a pasture on strongly sloping to steep soils, such as those of the Hickory, Negley, Hennepin, and Velma series, is to kill the sod in spring by plowing the less sloping areas and disking the steeper ones. Special equipment is needed to renovate areas where the slopes are steeper than 30 percent. Such areas should be disked after weeds and grasses appear, because disking allows moisture to accumulate in the soil. Enough lime should be applied to give the surface layer of the Hickory and Negley soils a pH value of 7, so that it will be about neutral in reaction. The Hennepin soils are neutral to alkaline and do not need additional applications of lime. Needed phosphorus and potassium ought to be applied at the time of seeding. The cost of applying amendments is great enough, however, no matter what the size of the application, that applying a large amount of plant nutrients at one time is more economical than applying a small amount frequently.

August is the best time to seed pastures if enough moisture is available. On these soils alfalfa, mixed with tall fescue or orchardgrass, has proved to be the most suitable species for producing pasture for cattle. Renovating in strips reduces the hazard of erosion in steep areas or on long slopes. In the steep or bare areas that might erode, a light application of straw or a mulch of manure after seeding helps to control erosion and encourages the development of a good stand.

Reseeded pastures need careful management to prolong the life of the alfalfa. Rotating the pasture helps to maintain the stand. Alfalfa should not be pastured after the middle of September, because the plants need time to build up a reserve of plant nutrients for use during winter and the following spring. Potassium and phosphorus ought to be applied annually if they are needed to maintain the supply of plant nutrients in these soils. After the stand is about 5 years old, several tons of lime are generally needed to maintain the neutral reaction of the surface layer. Keeping the stand in good condition is better than allowing it to deteriorate and then going through the costly process of renovating.

After the legumes disappear, reseeding should usually be repeated. Nevertheless, if the stand of grass is good, and if reseeding is difficult, a nitrogen fertilizer can be applied annually instead of reseeding the areas, and a year's use of the land is not lost. The nitrogen fertilizer replaces legumes as a source of nitrogen and keeps the grasses highly productive.

Pasture management for nearly level soils of bottom lands.—In this group are the nearly level bottom-land soils of the Lawson, Colo, Radford, and Landes series, in management groups I–3, IIw–1, and IIIs–1. In most places these soils occupy narrow strips, between areas of steep Hickory and Velma soils. These strips are divided into even smaller areas by meandering streams. Using large equipment to farm these small areas is difficult. Therefore, many of them are used for pasture.

Most of these soils of bottom lands are fertile and have good moisture-supplying capacity. Because they occur in low areas, they are protected from drying winds, and they generally produce high yields of pasture. Flooding that lasts for a period of several hours to several days, however, is a hazard.

These soils are well suited to ladino clover, and the Landes soil and areas of other soils that are not poorly drained and that are flooded for only short periods are also suited to alfalfa. Tall fescue and orchardgrass are the most desirable grasses for these soils, but bromegrass does well in the valleys of the smaller streams that do not overflow or where flooding is of only a few hours' duration. The Colo soil, in the valleys of the larger streams, is suited to reed canarygrass and ladino clover. At times, that soil is flooded for periods lasting for several days.

These soils are mostly about neutral in reaction, but tests are needed to determine the requirements for lime, phosphorus, and potassium. Then, the proper kinds and amounts of fertilizer should be applied. Ladino clover and tall fescue can best be seeded in spring as soon as a good seedbed can be prepared. The pastures need to be managed so that the growth of ladino clover will be encouraged. They should be purposely undergrazed early in spring when growth is most rapid. Deferring grazing not only permits the ladino clover to reseed naturally, but it also allows the plants to produce highly nutritious forage that will be ready later when growth of the plants is slower. Where ladino clover has produced seed, the pastures are usually restored by volunteer seed that has germinated.

After a pasture is established, enough fertilizer needs to be applied to maintain a good stand and the growth of the pasture plants. A fertilizer high in content of phosphorus and potassium increases the yields of legumes and makes them more able to compete with the grasses. Nitrogen, on the other hand, increases the production of the grasses, and thus suppresses the growth of legumes in the mixture.

Pasture management for nearly level or gently sloping, slowly permeable soils.—This pasture management is applicable to the Cowden, Cisne, Hoyleton, Oconee, Weir, and other nearly level or gently sloping, slowly permeable soils of management groups IIw–2, IIe–4, IIIw–1, IIIw–2, and IVw–1. These soils are not commonly used for pasture, but satisfactory yields of pasture are generally produced under good management. Alfalfa and ladino clover are the best long-time legumes for mixtures on these soils. For pastures that will be productive for a shorter time, alsike clover is suitable. The stand of alfalfa generally does not last long on the Weir soil, even though this soil is properly fertilized and well managed. Tall fescue is the best kind of grass to grow on the soils of this group, but the soils are also suited to orchardgrass, timothy, and redtop.

Where a new pasture is to be seeded or on old pasture is to be reseeded, planting a row crop in the area 1 year before seeding the pasture mixture helps to eliminate most of the undesirable weeds, grasses, and perennial weeds. Oats can then be seeded and used for pasture, or development of the pasture can be delayed until summer. Seeding a pasture later in summer is usually most desirable, as these soils are slow to dry out and do not warm up until late in spring. Then, it is too late to obtain a good stand of the commonly grown pasture grasses. Pastures on these soils need about the same kind of management as that used for other pastures, except that care must be taken to keep livestock from trampling the areas when the soils are wet.

Pasture management for nearly level to sloping, moderately permeable to slowly permeable soils.—This pasture management is applicable to the nearly level to sloping, moderately permeable to slowly permeable soils of the Herrick, Harrison, Douglas, Hosmer, and similar soils in management groups I–1, I–2, IIe–1, IIe–2, IIe–3, IIIe–1, IIIe–2, and IIIe–3. These soils are seldom used for pasture because they are highly desirable for row crops, but they are well suited to a number of perennial legumes that can be used for pasture, including alfalfa, ladino clover, and alsike clover. They are also suited to many kinds of grasses, for example bromegrass, tall fescue, orchardgrass, and timothy.

No unusual problems are encountered in establishing or managing pasture on these soils. Seeding can be done either early in spring or late in summer, as desired. Applying the proper kinds and amounts of fertilizer is important. Lime, phosphorus, and potassium are needed for good stands of forage that will last for several years. Nitrogen is needed for grasses and for grass-legume mixtures where the legumes are dying out.

Capability Groups of Soils

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The classification does not apply to most horticultural crops, or to rice and to other crops that have their special requirements. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and management group. These are discussed in the following paragraphs.

Capability Classes, the broadest grouping, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I. Soils have few limitations that restrict their use.

Class II. Soils have some limitations that reduce the choice of plants or require moderate conservation practices.

Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV. Soils have very severe limitations that restrict the choice of plants, require very careful management, or both.

Class V. (None in Montgomery County) Soils subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Class VI. Soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VII. Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Clas VIII. (None in Montgomery County) Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in some parts of the United States, but not in Montgomery County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V (none in Montgomery County) can contain, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

Management Groups, also called capability units, are soil groups within the subclasses. The soils in one management group are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the management group is a convenient grouping for making many statements about management of soils. Management groups are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–1 or IIIw–1. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic number specifically identifies the management group within each subclass.

In the following pages, the management groups of Montgomery County are described and suggestions for the use and management of the soils are given. Suggestions are not given for applying lime and fertilizer, because the amounts of lime and the kinds and amounts of fertilizer required need to be determined by testing the soils. The names of soil series represented are mentioned in the description of each management group, but this does not mean that all the soils of a given series appear in the unit. Also, Gullied land was not placed in a management group, because it is not suitable for farming. To find the names of all the soils in any given management group, refer to the "Guide to Mapping Units" at the back of this soil survey.

MANAGEMENT GROUP I–1

In this management group are nearly level Harrison and Pike soils. The surface layer of these soils is silty. In the Harrison soil, the content of organic matter is medium to high, but in the Pike soil, it is low. Both soils have a medium content of phosphorus and potassium. Permeability is moderate, and the available moisture capacity is high. The water table is deep.

These soils are well suited to corn, soybeans, wheat, oats, red clover, and alfalfa. Plowing them early in spring is generally better than plowing in fall. If the soils are plowed in fall, heavy rains in winter and spring can make the plow layer too compact for a good seedbed. Lime, phosphorus, and potassium are needed to keep the soils productive. Nitrogen must also be added regularly, especially to corn and wheat. Row crops can be grown year after year, but rotating crops is a desirable practice for controlling harmful insects, plant diseases, and noxious weeds.

MANAGEMENT GROUP I–2

Nearly level soils of the Clarksdale, Herrick, Ipava, and Nokomis series are in this group. These soils have a silty surface layer. They generally have a low water table, but the water table is high for short periods after heavy rains, mainly early in spring. At times when the water table is high, water is within 2 feet of the surface. These soils have a medium to high content of organic matter, nitrogen, phosphorus, and potassium. The available moisture capacity is high, and permeability is moderate to moderately slow. Surface runoff is slow to medium.

These soils are well suited to corn, soybeans, wheat, oats, alfalfa, and red clover. They can be used for row crops year after year if adequate nitrogen is applied. For good yields, the supplies of phosphorus and potassium must be kept high. Tile drains and open ditches have been installed in most of the areas. In some areas, however, additional tile drains would be beneficial.

MANAGEMENT GROUP I–3

Dark-colored, silty Lawson (fig. 10) and Radford soils on flood plains are in this management group. The water table is normally low. At times, however, it is near the surface for short periods, most often after heavy rains late in winter and in spring. In some years these soils are also subject to flooding, which generally occurs early in spring. Row crops are normally not damaged greatly by temporary flooding.

The available mosture capacity is high. The content of organic matter and nitrogen is medium to high, and the content of phosphorus and potassium is generally high. Unlike most of the soils of this county, these soils are about neutral in reaction. Applications of lime are generally not required.

Because these soils are subject to flooding, they are better suited to corn, soybeans, and other summer annual crops than to crops planted early in spring. Small grains and red clover can be grown in some places, however, where the hazard of flooding is slight. Open ditches and diversion terraces provide protection from runoff that could spread over large areas and cause damage.

In most places tile drains work satisfactorily and provide adequate drainage. If tile drains are to be installed, the Lawson soil needs to be examined to see if it contains sandy areas at tile depth. Where tile drains are installed in areas of sand, the sand can be washed into the tile and eventually fill the drain.

These soils are generally plowed in spring rather than in fall. This is done because the plow layer would be compacted if these soils were flooded during winter or early in spring, and if water stood on them.

MANAGEMENT GROUP IIe–1

Gently sloping Camden, Douglas, Harrison, Pike, Sicily, and Terril soils are in this management group. Most of these soils have a silty surface layer. The water table rarely rises to a height above 3 feet from the surface, and normally it is below the depth to which roots penetrate.

These soils are well drained or moderately well drained, are moderately permeable, and have high available mois-

***Figure 10.*—A field of nearly level Lawson silt loam of management group I–3, with a sloping Hickory soil in the background.**

ture capacity. Their content of organic matter ranges from low to high. All of these soils, except the Camden and Pike, have a medium content of phosphorus and potassium, and the Camden and Pike soils have a low content of those elements. Surface runoff is medium and can cause erosion.

The soils of this group are suited to many different crops and are used mainly for corn, soybeans, wheat, oats, red clover, and alfalfa. Terracing, farming on the contour, rotating crops, managing crop residue properly, and keeping tillage to a minimum are practices that are used to help control erosion.

The cropping system needed to control erosion depends upon the other practices that are used. If the soils are not terraced or farmed on the contour, erosion can be controlled by using a cropping system in which grasses and legumes are grown for meadow 2 years out of 5 or 1 year out of 3. Where terracing and contour farming are practiced, these soils are suited to row crops and small grains grown year after year.

These soils need to have the residue from corn and soybeans left on the surface over winter. The residue provides a mulch that reduces the force of raindrops striking the soil, and it thereby helps to control erosion. Plowing in spring is more desirable than plowing in fall, for the soils are likely to erode if they are plowed in fall. Leaving the surface as cloddy as possible while still breaking the clods enough to make a satisfactory seedbed improves the soil structure. Too much tillage breaks down the soil structure and causes excessive runoff and erosion. Except on the Terril and Camden soils, grassed waterways and small dams are needed in many places to remove runoff without causing erosion. The Terril and Camden soils are on alluvial fans and stream terraces where runoff from the adjacent higher areas could cause erosion. Diversion ditches are needed in some places to protect those soils.

MANAGEMENT GROUP IIe–2

In this management group are sloping Camden, Douglas, Harrison, Pana, Pike, Sicily, and Velma soils that are slightly to moderately eroded. Most of these soils have a silty surface layer. Surface runoff is rapid, and further erosion is a hazard.

All of these soils but the Pana and Velma have high available moisture capacity, and those soils have moderate available moisture capacity. In the Camden and Pike soils, the content of organic matter is low; in the Douglas and Harrison soils, it is high; and in the rest of the soils it is medium. The Pana and Velma soils are low in content of phosphorus and potassium, and the other soils are medium in content of those elements.

The soils of this group are suited to corn, soybeans, wheat, red clover, alfalfa, and a number of other crops. Liberal amounts of fertilizer are needed, however, to help produce fast-growing, healthy plants that will protect the soils from erosion, generally produce good yields, and add organic matter.

If these soils are used for row crops, they should be terraced, farmed on the contour, or stripcropped. Crop residue, for example shredded cornstalks left on the surface in fall after the corn is harvested, helps to reduce losses from erosion. When the seedbed is prepared, tillage needs to be kept to a minimum, and only the row tillage necessary to secure germination of the crop is advisable. Plowing in fall increases the hazard of erosion. Grassed waterways and small dams are needed to remove runoff safely without damaging the soils. Where those practices are not used to control erosion, the soils are suited primarily to meadow and pasture, though they can be used occasionally for a row crop.

MANAGEMENT GROUP IIe-3

Gently sloping Hosmer and O'Fallon soils that have a silty surface layer are in this management group. These soils have a compact layer (fragipan) in the lower part of the subsoil. They do not have a water table within the depth to which the roots of most crops penetrate. The fragipan prevents water from draining through the lower part of the subsoil. Therefore, these soils are only moderately well drained, even though runoff is medium to rapid. The upper part of the subsoil is moderately permeable, and the lower part is very slowly permeable. Because the fragipan limits the depth to which roots penetrate, these soils are considered to be only moderately deep where they are used for farming. They have only moderate available moisture capacity.

These soils are subject to erosion if they are plowed and are not protected. They are very strongly acid throughout their profile. The Hosmer soil is low in content of phosphorus, potassium, nitrogen, and organic matter. The O'Fallon soil is low in content of phosphorus and potassium, and medium in content of nitrogen and organic matter.

These soils are less well suited to corn and soybeans than many of the other soils in the county because of their moderate available moisture capacity. They are better suited to wheat than to corn or soybeans because wheat grows in fall, winter, and spring when the supply of moisture is usally abundant. The soils are moderately well suited to alfalfa if they receive enough lime and fertilizer.

Constructing terraces or growing meadow crops about 1 year out of 3 provides protection from erosion. If contour farming is practiced and tillage is kept to a minimum, row crops can be grown a greater part of the time in the cropping system and losses from erosion will still be kept low. Making the maximum use of crop residue and delaying plowing as long as feasible so that crop residue will be left on the surface helps to control erosion. Grassed waterways and dams are needed in many places to prevent runoff from causing gullying.

MANAGEMENT GROUP IIe-4

In this management group are mainly gently sloping, light-colored and moderately dark colored Hoyleton, Oconee, Starks, and Stoy soils that have a silty surface layer and a slowly permeable subsoil. Some of these soils are eroded to the extent that only the plow layer remains of the original surface layer.

Because the subsoil is slowly permeable, much of the water runs off these soils and causes erosion. Also, drainage is somewhat poor because excess water that enters the surface soil does not drain down through the subsoil. As a result, the plow layer is too wet for planting and tillage for long periods after extensive rainfall in spring. The available moisture capacity is high.

All of these soils are low in content of phosphorus. The Stoy and Starks soils are also low in content of organic matter and nitrogen, and the Oconee and Hoyleton soils are medium in content of organic matter and nitrogen. The Starks and Oconee soils have a medium content of potassium, and the other soils are low in that element.

The soils of this group are better suited to corn, soybeans, wheat, clover, and alfalfa than to most other crops commonly grown. Oats are not usually grown, because the soils are generally too wet for planting until so late in spring that yields are low. Wetness also delays the planting of corn and soybeans until after the best dates for planting those crops. Consequently, yields of corn and soybeans are likely to be lower than those on more permeable soils.

Large amounts of fertilizer are needed, and terraces are also needed if these soils are used for row crops. Where the only erosion control practice used is farming on the contour, a suitable cropping system is one in which meadow crops are grown about 1 year out of 4 or 2 years out of 5. If the soils are not farmed on the contour, a cropping system in which legumes or grasses are grown for meadow or pasture about 1 year out of 3 keeps losses from erosion to a minimum.

MANAGEMENT GROUP IIw-1

In this management group are dark-colored, poorly drained soils of the Colo, Harvel, Shiloh, and Virden series. These soils are in depressions where the water table is high during wet seasons, unless it has been lowered by installing tile drains. During long dry periods in summer and fall, the water table is below the depth to which the roots of most crops penetrate.

These soils have moderate or moderately slow permeability and high or very high available moisture capacity. They have a high content of organic matter and nitrogen and a medium to high content of phosphorus and potassium. Runoff is slow to medium, depending upon the effectiveness of the open ditches that have been constructed to improve drainage. If runoff is slow enough, water collects on the surface. Then, wetness delays the planting of crops or damages crops that are growing on these soils. The Colo soil is also subject to occasional flooding when streams overflow. Flooding usually occurs early in spring before corn, soybeans, or other row crops are planted.

Corn and soybeans are the principal crops, but some red clover, alfalfa, and wheat are grown. The soils are well suited to these crops, but tile drains and open ditches are needed to provide drainage. Additional tile drains should be installed if these soils remain wet in spring after others in the area are dry enough for tillage. Even where drainage has been improved, a good seedbed is difficult to prepare because of the large amount of clay in the plow layer. Fall plowing is better than spring plowing because the hard clods tend to break down during winter after they have frozen and then thawed, and after they have become wet and then dried. Where the soils are not fall plowed, plowing them in spring as soon as they are dry enough for tillage helps in preparing a suitable seedbed. Intensive cropping to corn, soybeans, and other row crops can cause these soils to be in poor tilth. Tilth is improved by growing grasses and legumes occasionally.

MANAGEMENT GROUP IIw–2

Nearly level to gently slopping soils of the Cowden, Ebbert, Hoyleton, Oconee, and Stoy series are in this capability unit. These soils have a silty surface layer and a fine textured or moderately fine textured subsoil. The color of the surface layer ranges from moderately dark in the Cowden soil to light in the Stoy.

The Ebbert soil has moderately slow or slow permeability, and the other soils have slow permeability. In the nearly level areas, water remains on the surface for long periods, unless ditches have been constructed to remove it (fig. 11). In most places the Stoy, Oconee, and Hoyleton soils have enough slope so that most of the water drains off and drainage ditches are not needed. In the Ebbert soil, the water table is high during wet seasons, especially in spring. Even where ditches have been installed, these soils remain wet in spring, and crops cannot be planted until after the most favorable time for planting.

The soils of this group are suited to corn, soybeans, wheat, clover, and alfalfa, and they are generally used for those crops. Oats are not generally grown, because in most seasons they cannot be sown until long after the most desirable time for planting. Yields are generally lower than on other nearly level soils. At least part of the time, the lower yields are caused by a delay in planting the crop in spring. Wheat grows well on these soils and formerly was the crop most commonly grown. Fertilizer and lime are needed.

Plowing in fall is not a general practice, though erosion is not a hazard. Where the soils are plowed in fall, the plow layer becomes much too compact to make a good seedbed after the clods have been broken down during winter by freezing, thawing, and heavy rains. Excess water needs to be removed by installing ditches or grassed waterways, depending upon the slope of the drainage channel. Except in the Ebbert soil, tile drains are not practical. In areas of the Ebbert soil that are adjacent to Virden soils, tile drains can be installed by spacing the laterals at close intervals so that an entire field can be drained.

***Figure 11.*—A wet spot in a field of Cowden silt loam showing the effects of poor drainage on corn. Wet areas such as this are typical in soils of management group IIw–2.**

MANAGEMENT GROUP IIIe–1

In this management group are sloping and rolling soils that are slightly to seriously eroded. These soils are in the Blair, Douglas, Hickory, Pana, Pike, Velma, and Walshville series. In none of these soils is wetness a serious hazard, though the Blair soil has colors that indicate somewhat poor drainage.

In most places runoff is rapid on these sloping soils. The content of organic matter and nitrogen is high in the Douglas soil, medium in the Pana and Velma soils, and low in the other soils. The Douglas and Pike soils, which have developed in loess, have a moderate content of phosphorus and potassium, and the other soils, developed in glacial till, have a low content of those elements. All of the soils have an acid root zone. The Douglas and Pike soils have high available moisture capacity, and the other soils have moderate available moisture capacity. Permeability is moderately slow or slow in the Blair soil and moderate in the other soils.

The soils of this group are suited to corn, soybeans, wheat, alfalfa, and pasture. The alfalfa is a high-value crop when grown with tall fescue and bromegrass for hay or pasture. Excessive soil erosion can result if corn, soybeans, or other row crops are grown without using contouring, terracing, or other practices that help to protect the soils. A well-planned water-disposal system, including grassed waterways, dams, and diversion ditches or diversion terraces, is needed. Also crop residue, left on the surface, provides cover, promotes the infiltration of water, and reduces losses from erosion.

MANAGEMENT GROUP IIIe–2

In this management group are light-colored and moderately dark colored, sloping Hosmer and Oconee soils that are slightly eroded to moderately eroded. These soils have slowly permeable lower horizons, but drainage is not required. Water runs off rapidly. Even so, many of these soils dry out slowly in spring. The unfavorable characteristics of the lower part of the subsoil make the available moisture capacity moderate. In the Oconee soil that is not eroded or that is only slightly eroded, the content of organic matter and nitrogen is medium, and in the other soils, it is low. The content of phosphorus is generally low, and the content of potassium is medium.

These soils are only moderately well suited to corn, soybeans, wheat, hay, and meadow crops if erosion control practices and other good management practices are used. Growing row crops without farming on the contour or terracing is likely to cause losses from erosion. Even where the soils are farmed on the contour and terraced, growing corn or soybeans for 2 or more years in succession can cause excessive losses from erosion. In many places grassed waterways and erosion control dams are needed to carry runoff away safely without causing gullying.

MANAGEMENT GROUP IIIe-3

In this management group are Tamalco and Walshville soils that have an alkaline subsoil that contains excess exchangeable sodium, and Hoyleton, Oconee, and Velma soils that have an acid subsoil. The Hoyleton and Oconee soils are intermingled with Tamalco soils, and Velma soils are intermingled with the Walshville soils. The soils are gently sloping to sloping and have a light-colored to moderately dark colored, silty or loamy surface layer. Most of them are eroded to some extent. Because the subsoil is slowly permeable in most places, further erosion is a serious hazard, and it would make these soils less suitable for crops. Further erosion would be especially serious in the soils that have an alkaline subsoil and that have a high content of sodium, in addition to having other undesirable characteristics.

Runoff is generally rapid. Therefore, artificial drainage is not needed, except in small seepy areas. The content of organic matter, nitrogen, phosphorus, and potassium is low, and the available moisture capacity is moderate.

The Tamalco soils are not well suited to crops, and further erosion would make them even less suitable. Except in years when the amount of moisture is favorable, the other soils are also not well suited to crops. The limited available moisture capacity makes the soils better suited to wheat than to corn and soybeans. Large amounts of fertilizer are needed.

The soils of this group should be tilled only enough so that a good seedbed can be prepared. Excessive tillage increases runoff and consequently causes soil erosion. Fall plowing exposes the soils to erosion over winter. Contouring, terracing, and similar erosion control practices protect the soils if row crops are grown year after year. Where those practices are used, meadow and pasture crops grown 1 year out of 3, or 2 years out of 5, provide satisfactory control of erosion. If those practices are not used, growing meadow crops almost continuously is necessary to reduce losses from erosion to a safe level. Small grains ordinarily are used when a meadow crop is to be reseeded.

MANAGEMENT GROUP IIIw-1

In this management group are nearly level or gently sloping, poorly drained Chauncey, Cisne, Racoon, and Weir soils that have a slowly permeable or very slowly permeable subsoil. All of these soils have a silty surface layer. In general, the surface layer of the Chauncey, Cisne, and Racoon soils is moderately dark colored, and that of the Weir soil is light colored.

Surface drainage is generally slow, and shallow ditches have been installed in many places to improve drainage. Water does not seep down through the profile when these soils become fully moist. As a result, the soils are often too wet for tillage until late in spring, and they are too wet for tillage in some years until summer. Corn and soybeans are likely to be damaged if the amount of rainfall is higher than average. Crops turn yellow from lack of nitrogen because of denitrification that occurs in wet soils. The slow permeability keeps water from moving into the tile drains that have been installed. The Weir soil is low, and the other soils are low to medium, in content of organic matter and nitrogen. All the soils are low in content of phosphorus and potassium.

These soils can be used for corn and soybeans, but they are more suitable for wheat. They are sometimes too wet for corn and soybeans to be planted and tilled at the proper time. Additional ditches are needed in some areas. In others the present ditches need deepening. Large applications of lime, nitrogen, phosphorus, and potassium are needed.

MANAGEMENT GROUP IIIw-2

In this management group are intermingled soils of the Cowden, Herrick, and Piasa series. These soils have a moderately dark colored or dark colored, silty surface layer, and they have a high water table late in winter and early in spring. The color of the Piasa surface layer is light enough that those soils can be easily distinguished in a field in which soils of this group occur.

The lower part of the Piasa subsoil is alkaline, and those soils contain a large amount of sodium. The subsoil of the Cowden and Herrick soils is acid. The Piasa and Cowden soils are very slowly permeable, and the Herrick soil is moderately permeable. In the Piasa soils, the content of organic matter, nitrogen, phosphorus, and potassium is low, and in the Cowden soils, it is medium. In the Herrick soil, the content of organic matter and nitrogen is high and the content of phosphorus and potassium is medium. During seasons of moderately dry weather, the growth of crops is limited by the shallow root zone of the Piasa soils, which reduces the supply of available moisture. The Cowden and Herrick soils have high available moisture capacity. Crops grown on those soils are affected only slightly by dry weather.

The soils of this group are suited to corn, soybeans, wheat, alfalfa, and clover. The Piasa soils are less well suited to those crops, however, than the Herrick and Cowden soils, because they often dry out so slowly in spring that planting time is long delayed. The Piasa soils are practically impermeable to water. Therefore, tile drains placed in those soils do not improve drainage. Also, tile drains do not improve drainage of the Cowden soils, because that soil has a dense, compact subsoil. If water remains on the surface of the Piasa and Cowden soils after rains, shallow ditches should be dug to remove the excess water. Tile drains can be profitably installed in the larger areas of Herrick soil, provided only small acreage of Piasa soils is intermingled with the areas of Herrick soil.

The alkaline lower subsoil and high content of sodium make a supply of plant nutrients hard to maintain in the Piasa soils, for plants have difficulty utilizing the phosphorus and potassium in soils that are alkaline. They are able to use only the phosphorus and potassium in the less alkaline or slightly acid upper part of the profile, instead of having those plant nutrients available throughout the root zone, as in most soils. Consequently, a larger supply of phosphorus and potassium must be maintained in the plow layer to compensate for their restricted availability in the subsoil. Additional information about using and managing the Cowden soils can be found by referring to management group IIw-2. Additional information about using and managing the Herrick soil can be found by referring to management group I-2.

MANAGEMENT GROUP IIIs-1

Landes fine sandy loam is the only soil in this management group. It is a sandy, dark-colored, nearly level soil that has formed in alluvium on flood plains. Drainage is somewhat poor, and the colors throughout the profile are typical of those of a somewhat poorly drained soil. Nevertheless, the water table is high for only a few days each year. Flooding occurs occasionally. It is not a serious hazard, however, because this soil is at a somewhat higher elevation than the other soils of flood plains. The available moisture capacity is moderate to low. Therefore, yields are often limited by lack of adequate moisture in all but the most favorable years. The content of organic matter and nitrogen is medium, and the content of phosphorus and potassium is low. The reaction is slightly acid to neutral. Runoff is slow because much of the water that falls on this soil moves rapidly downward through the profile.

This soil is suitable for corn and soybeans. It can also be used for wheat and for clover grown for hay, but it is less well suited to those crops. The soil does not hold plant nutrients well. Therefore, applying annually the amount of fertilizer needed is better than applying a large amount of fertilizer that is likely to be leached out of the soil. Nitrogen is generally needed, especially for corn.

MANAGEMENT GROUP IVe-1

This management group consists of sloping to rolling, slightly eroded to severely eroded soils of the Blair, Hickory, Hosmer, and Velma series. These soils have a medium-textured or fine-textured plow layer that is underlain by an acid subsoil. In the severely eroded soils, the original surface layer has been washed away and the light-colored subsoil is now exposed. As a result, these soils are low in content of organic matter.

In these soils the content of nitrogen and phosphorus is generally low and the content of potassium is low to medium. The available moisture capacity is moderate, and yields are limited by lack of moisture in most years. The strong slopes in many places, and the clayey texture of the present surface layer, cause water to run off rapidly in the severely eroded spots. Much of the water that should be stored in the soils runs off, causes erosion, and is therefore not available to plants.

These soils are suited to hay and meadow crops. Alfalfa and ladino clover generally yield well and make good pasture if they are grown in combination with tall fescue, bromegrass, or orchardgrass. Good stands of legumes are needed because of the low content of organic matter and nitrogen. Proper fertilization is needed for good stands of all crops.

MANAGEMENT GROUP IVw-1

The only mapping unit in this management group is Cisne-Huey complex. The soils of that complex are nearly level and are poorly drained. Permeability of the subsoil is slow or very slow, and excess water does not move downward through the profile after the soils have become wet. Both the Cisne and Huey soils have an acid surface layer. The Cisne soil also has an acid subsoil, but the Huey soil has an alkaline subsoil that is high in content of sodium. Both the soils are low in content of organic matter, nitrogen, phosphorus, and potassium. Their available moisture capacity ranges from high, where the Cisne soil has received a large amount of fertilizer, to moderate or low in the Huey soil.

These soils are suited to corn, soybeans, wheat, and clover. If more than the average amount of rainfall is received, however, corn and soybeans tend to turn yellow from lack of nitrogen because of the denitrification that takes place when the soils are wet. The soils are not well suited to oats, because they are usually too wet to till early in spring when oats should be sown. The reaction, or pH, of the plow layer needs to be kept at about 6.5 to 7.0. Care must be taken not to add excessive lime to the Huey soil, however, because that soil has an alkaline subsoil near the surface. The phosphorus and potassium in alkaline soils are less available to plants than in a soil that has a neutral to slightly acid plow layer.

Open ditches are used to improve drainage in these soils, for tile drains will not function because of the slow or very slow permeability of the subsoil. The surface layer has weak structure, and heavy rains tend to make the soil material compact after plowing has been completed. For this reason, these soils are plowed in spring. If they were plowed in fall, they would have to be plowed again in spring if the normal number of heavy rains is received.

MANAGEMENT GROUP VIe-1

In this management group are strongly rolling and steep, light-colored soils of the Hennepin, Hickory, and Negley series. These soils have a surface layer of loam to clay loam.

Surface runoff is rapid, but much of the water from rainfall enters these soils if the cover of grass or trees is adequate. In general, the reaction of the surface layer ranges from medium acid to neutral, but it is alkaline in some areas. Areas of Hennepin soils that are intermingled with areas of Hickory soils are likely to have an alkaline surface layer. The content of phosphorus is low in most places, and the content of potassium is medium. The available moisture capacity and permeability are generally moderate.

These soils are too steep and easily eroded to be used for tilled crops, but they are well suited to pasture and hay. Most of the acreage is in pasture and woods, but managing meadow is difficult in many places, because the areas are so steep. Extreme care is necessary to keep from overturning ordinary farm machinery used for reseeding and mowing. Also, special care is necessary if three-wheeled tractors are operated on these soils.

Many of the wooded areas are used as pasture. They supply only a small amount of forage of poor quality, however, and are worthless for fattening likestock. The likestock eat small trees and prevent reproduction of desirable kinds of trees. Their trampling also compacts the soils. As a result, the absorption of water is restricted and many roots that are near the surface are destroyed. Intensive grazing leaves the soils bare and subject to erosion.

Farmers should select areas of these soils that are the best suited to trees or pasture. They then need to improve the wooded areas by protecting them from grazing. Trees can be planted where necessary, or the areas can be cleared and improved for pastures. Many of these soils have a surface layer that is neutral or alkaline in reaction. Therefore, it is advisable to determine the pH value before pine trees are planted, for pines do not grow well on soils that are neutral to alkaline in reaction. Additional information about management of pastures on these soils can be found in the subsection "General Management of Soils Used for Pasture." Facts about management of wooded areas can be found in the subsection "Use of the Soils as Woodland."

MANAGEMENT GROUP VIIe-1

In this management group are very steep, light-colored or moderately dark colored soils of the Hickory and Hennepin series. These soils have a loam surface layer. In places, mainly in areas of Hennepin soils that are intermingled with areas of Hickory soils, calcareous material is near the surface. These soils are well drained, have moderate available moisture capacity, and have a medium acid to alkaline surface layer.

The slopes are too steep for farm machinery to be used in renovating pastures. Therefore, these soils are ordinarily better used for trees. Where pines are to be planted, the soils should be tested at the site, for pines make only poor growth or none at all in areas where the pH value is high. Additional information about use of these soils for trees is given under "Use of the Soils as Woodland," in the discussion of woodland suitability group 1.

Estimated Crop Yields

Table 5 gives estimates of average acre yields of the principal crops grown in Montgomery County under two levels of management. These estimates are for yields obtained over periods long enough that they include the usual ranges in temperature and precipitation that occur in the county. Annual yields for a given soil and level of management, however, can range from 20 percent above the figures shown to 20 percent below. The extremes may be even greater if the weather is extremely unusual during a growing season. In columns A are yields to be expected under a moderately high level of management practiced by many farmers whose management is above average. In columns B are yields to be expected under the high level of management practiced by about 10 percent of the farmers in the county.

Under the moderately high level of management used to obtain the yields in columns A, commercial fertilizer and lime are applied, but often in smaller amounts than needed for best returns; inadequate, but nearly adequate, practices are used to help control erosion and to improve drainage; the cropping system selected may not be especially suitable; the population of plants may be either too low or too high; the supply of organic matter may be inadequate, and the soils may not be in good tilth; tillage and other cultural practices are inadequate; the kinds of seed may not be most suitable; control of weeds, diseases, and harmful insects is inadequate; or the proper combination of practices is not applied in the most timely manner.

Under the high level of management used to obtain the yields in columns B, adequate surface drainage and internal drainage are provided; protection from flooding is provided where needed; practices that help to control erosion are used; tillage is not excessive and is properly done; the proper kinds and amounts of seed of good quality are planted; and weeds, diseases, and harmful insects are controlled. Also, favorable soil reaction (about pH 6.5 for most crops) and an optimum level of available phosphorus and potassium are maintained for various crops by applying lime, phosphate, and potash according to the needs indicated by the results of soil tests and previous management.

A high level of management also includes using crop residue efficiently; applying barnyard manure; growing a crop for green manure; and using a cropping system designed to control erosion, to maintain the optimum amount of organic matter, and to facilitate the production and utilization of nitrogen in the soils. In addition, it includes supplementing the supply of nitrogen in the soils by applying a nitrogen fertilizer, as needed; harvesting crops and incurring only minimal losses; and combining all of these practices efficiently so as to create the best growing conditions for each crop within the limits imposed by weather. Because conditions differ from field to field and the weather varies from one season to another, great skill and careful attention to details are required to attain a consistently high level of management.

The estimates of yields are based on current information and can be expected to change as farming techniques, varieties of crops, and soil management improve. They are based on current data obtained from the results of research by the Illinois Agricultural Experiment Station; on records kept by farmers in cooperation with the University of Illinois Department of Agricultural Economics; and on the experience of scientists who specialize on information about soils and crops. Part of the information is the result of special research studies that were conducted to determine the yields of corn, soybeans, wheat, and alfalfa and mixed hay grown on the Carlinville Agronomy Research Field and managed in different ways.[5] Herrick, Harrison, and Cowden silt loams are predominant in this field, and they are also extensive in the central and northern parts of Montgomery County. All crops grown on the Carlinville field responded well to applications of lime and potash. Alfalfa responded well to phosphate, and wheat responded well to nitrogen and markedly well to applications of phosphate, especially superphosphate. Applying 50 or 100 pounds of nitrogen to first-year corn that was preceded by alfalfa gave small increases in yields, but a greater increase in yields would be expected where corn is not preceded by alfalfa.

Special studies of yields obtained where selected soils received special treatment were also carried on at the Brownstown Agronomy Research Center in Fayette County.[5] The Cisne, Hoyleton, and Huey silt loams in the field where these experiments were conducted are similar to the same soils in the southeastern part of Montgomery County. Crops grown on those soils respond well to applications of lime and potash. In fact, lime and potash are essential for growing crops economically on those soils. The crops also respond well to applications of nitrogen and phosphate if those elements are applied in suitable combinations. Because of the claypan in the subsoil, both drought and excessive moisture lower yields to a greater extent than on more permeable soils.

Use of the Soils as Woodland[6]

Originally, forests of deciduous hardwoods covered nearly 25 percent of Montgomery County, but now forests cover only about 10 percent. The county contains no State or national forests, and most of the wooded areas consist of farm woodlots, about 30 acres in size. All of these but one

[5] Details of these studies are on file in the Department of Agronomy, College of Agriculture, University of Illinois, Urbana, Ill.

[6] WILLIAM R. BOGGESS, Department of Forestry, University of Illinois, and CLARK W. RINKER, woodland conservationist, Soil Conservation Service, assisted in preparing this section.

TABLE 5.—*Estimated average acre yields of principal crops*

[Yields in columns A are those to be expected under a moderately high level of management; yields in columns B are those to be expected under a high level of management. For yields on the soils of bottom lands, it is assumed that no damage from flooding has occurred. Absence of a yield figure indicates that the soil is not well suited to the crop or that the crop is not commonly grown.]

Soil	Corn		Soybeans		Wheat		Alfalfa hay		Mixed rotation pasture		Bluegrass pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Animal-unit-days* [1]	*Animal-unit-days* [1]	*Animal-unit-days* [1]	*Animal-unit-days* [1]
Blair silt loam, 5 to 9 percent slopes, eroded	43	50	17	20	20	23	1.7	2.8	85	135	55	85
Blair soils, 5 to 9 percent slopes, severely eroded	35	41	13	16	16	19	1.3	2.4	70	115	40	75
Camden silt loam, 2 to 4 percent slopes	69	80	28	32	34	40	3.0	4.0	135	185	90	125
Camden silt loam, 4 to 7 percent slopes, eroded	59	70	22	26	27	33	2.6	3.6	115	165	70	110
Chauncey silt loam	68	86	29	34	32	39	2.6	3.7	130	180	80	115
Cisne silt loam	61	78	26	30	30	36	2.5	3.5	120	165	70	100
Cisne-Huey complex	50	64	21	25	25	30	2.0	3.0	95	130	55	80
Clarksdale silt loam	70	87	30	35	34	41	2.8	4.0	140	190	90	125
Colo silty clay loam	79	94	34	37	35	42	3.0	4.0	155	210	110	155
Cowden silt loam	67	85	29	34	33	40	2.7	3.9	135	185	85	120
Cowden-Piasa complex, 0 to 2 percent slopes	55	69	23	28	27	34	2.2	3.1	105	150	65	95
Cowden-Piasa complex, 2 to 4 percent slopes, eroded	49	63	20	25	24	30	1.9	2.8	95	135	55	85
Douglas silt loam, 2 to 4 percent slopes	69	88	30	34	35	41	2.9	4.1	145	205	95	140
Douglas silt loam, 4 to 7 percent slopes	67	86	29	33	34	40	2.8	4.0	140	200	90	135
Douglas silt loam, 4 to 7 percent slopes, eroded	62	81	27	31	32	38	2.6	3.8	130	185	80	125
Douglas silt loam, 7 to 12 percent slopes	64	83	28	32	33	39	2.7	3.9	135	190	85	130
Ebbert silt loam	70	86	30	34	32	39	2.9	3.9	140	195	90	130
Harrison silt loam, 0 to 2 percent slopes	73	91	31	36	36	44	3.0	4.3	150	210	100	145
Harrison silt loam, 2 to 4 percent slopes	72	89	31	35	35	42	2.9	4.2	145	205	95	140
Harrison silt loam, 2 to 4 percent slopes, eroded	66	85	29	33	33	40	2.7	4.0	140	195	90	135
Harrison silt loam, 4 to 7 percent slopes	68	87	30	34	34	41	2.8	4.1	140	200	90	135
Harrison silt loam, 4 to 7 percent slopes, eroded	63	82	28	32	32	39	2.6	3.9	135	190	85	130
Harvel silty clay loam	73	90	32	36	34	42	3.0	4.0	150	205	95	140
Herrick silt loam	74	93	32	37	36	45	3.0	4.3	150	210	100	145
Herrick-Piasa complex	60	73	25	30	30	38	2.4	3.2	120	170	80	115
Hickory loam, 7 to 12 percent slopes	45	50	17	20	20	23	1.8	2.8	90	140	60	90
Hickory loam, 7 to 12 percent slopes, eroded	38	44	15	18	17	20	1.4	2.4	80	130	50	80
Hickory soils, 7 to 12 percent slopes, severely eroded	32	39	12	15	14	17	1.1	2.1	60	100	40	65
Hickory loam, 12 to 18 percent slopes	--	--	--	--	--	21	1.6	2.5	85	135	55	85
Hickory loam, 12 to 18 percent slopes, eroded	--	--	--	--	--	18	1.3	2.2	75	120	45	75
Hickory soils, 12 to 25 percent slopes, severely eroded	--	--	--	--	--	15	1.0	1.9	55	95	35	60
Hickory loam, 18 to 30 percent slopes	--	--	--	--	--	--	1.4	2.3	80	130	50	80
Hickory loam, 30 to 60 percent slopes	--	--	--	--	--	--	--	--	75	120	45	75
Hickory-Hennepin loams, 18 to 30 percent slopes	--	--	--	--	--	--	1.2	2.1	80	130	50	80
Hickory-Hennepin loams, 30 to 60 percent slopes	--	--	--	--	--	--	--	--	70	115	40	70
Hickory and Negley loams, 15 to 35 percent slopes	--	--	--	--	--	--	1.6	2.5	85	135	55	85
Hosmer silt loam, 2 to 4 percent slopes	65	74	25	29	31	37	2.3	3.5	120	170	80	110
Hosmer silt loam, 4 to 7 percent slopes	61	71	23	27	29	35	2.2	3.4	115	165	75	105
Hosmer silt loam, 4 to 7 percent slopes, eroded	54	63	19	23	24	30	1.9	3.1	100	150	65	95
Hosmer soils, 4 to 7 percent slopes, severely eroded	45	52	15	18	20	25	1.4	2.6	90	130	50	80
Hosmer silt loam, 7 to 12 percent slopes, eroded	51	60	17	20	21	27	1.7	2.8	95	140	55	85
Hosmer soils, 7 to 12 percent slopes, severely eroded	39	47	13	16	15	20	1.2	2.3	70	110	40	70
Hoyleton silt loam, 0 to 2 percent slopes	62	79	26	30	30	36	2.6	3.6	120	165	70	100
Hoyleton silt loam, 2 to 5 percent slopes	59	76	25	29	29	35	2.5	3.5	115	160	65	95
Hoyleton silt loam, 2 to 5 percent slopes, eroded	54	71	23	27	27	33	2.1	3.1	105	150	55	85
Hoyleton-Tamalco complex, 1 to 4 percent slopes	48	61	21	24	24	29	2.0	2.9	95	130	50	80
Ipava silt loam	84	104	34	39	38	47	3.5	4.8	165	235	115	165
Landes fine sandy loam	60	72	23	26	27	34	2.8	3.8	120	170	70	105
Lawson silt loam	80	95	35	38	37	43	3.3	4.3	160	225	110	160
Nokomis silt loam	72	89	31	35	35	42	2.9	4.2	145	205	95	140
Oconee silt loam, 0 to 2 percent slopes	68	86	29	34	34	40	2.8	4.0	135	185	85	120
Oconee silt loam, 2 to 4 percent slopes	65	83	28	33	33	39	2.7	3.9	130	180	80	115
Oconee silt loam, 2 to 4 percent slopes, eroded	60	78	26	31	31	37	2.3	3.5	120	170	70	105
Oconee silt loam, 4 to 7 percent slopes	62	80	27	32	32	38	2.5	3.7	125	175	75	110
Oconee silt loam, 4 to 7 percent slopes, eroded	56	74	25	30	30	36	2.2	3.4	115	160	65	100

See footnote at end of table.

TABLE 5.—*Estimated average acre yields of principal crops*—Continued

Soil	Corn		Soybeans		Wheat		Alfalfa hay		Mixed rotation pasture		Bluegrass pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Animal-unit-days* [1]	*Animal-unit-days* [1]	*Animal-unit-days* [1]	*Animal-unit-days* [1]
Oconee-Tamalco complex, 0 to 2 percent slopes	55	69	23	27	27	32	2.2	3.2	105	145	60	95
Oconee-Tamalco complex, 2 to 4 percent slopes	53	67	22	26	26	30	2.1	3.1	100	140	55	90
Oconee-Tamalco complex, 2 to 4 percent slopes, eroded	49	63	20	24	24	28	1.9	2.9	95	135	50	80
Oconee-Tamalco complex, 4 to 7 percent slopes, eroded	46	59	19	23	23	27	1.8	2.8	90	125	45	75
O'Fallon silt loam, 2 to 4 percent slopes	61	79	27	32	32	38	2.5	3.7	125	175	75	110
Pana loam, 4 to 7 percent slopes, eroded	59	73	24	28	29	35	2.3	3.5	120	170	75	110
Pana loam, 7 to 14 percent slopes, eroded	55	69	22	25	26	32	2.2	3.3	115	165	70	105
Pike silt loam, 0 to 2 percent slopes	69	79	28	32	34	40	2.8	3.9	135	185	90	125
Pike silt loam, 2 to 4 percent slopes	67	77	27	31	33	39	2.7	3.8	130	180	85	120
Pike silt loam, 4 to 7 percent slopes	64	75	25	29	31	37	2.5	3.6	125	175	80	115
Pike silt loam, 4 to 7 percent slopes, eroded	57	70	22	26	27	33	2.1	3.3	110	160	70	105
Pike silt loam, 7 to 12 percent slopes, eroded	53	67	20	24	24	30	2.0	3.1	105	150	65	100
Racoon silt loam	64	82	28	32	31	37	2.6	3.6	125	175	75	110
Radford silt loam	78	93	34	37	36	42	3.2	4.2	155	210	110	160
Shiloh silty clay loam	75	91	33	36	34	41	2.8	3.8	155	205	100	145
Shiloh silt loam, overwash	71	87	31	35	32	37	2.6	3.6	145	195	90	125
Sicily silt loam, 2 to 4 percent slopes	67	83	28	33	33	40	2.7	3.9	140	190	90	125
Sicily silt loam, 4 to 7 percent slopes, eroded	59	75	25	30	30	37	2.4	3.6	125	175	80	115
Starks silt loam	71	82	29	33	35	41	3.1	4.1	140	190	100	130
Stoy silt loam, 0 to 2 percent slopes	69	79	27	31	34	39	2.9	3.8	130	180	90	120
Stoy silt loam, 2 to 4 percent slopes	66	76	26	30	33	38	2.8	3.7	125	175	85	115
Tamalco silt loam, 2 to 4 percent slopes	46	58	20	23	23	27	1.9	2.8	90	125	50	80
Tamalco silt loam, 2 to 4 percent slopes, eroded	41	53	18	21	21	25	1.5	2.4	80	120	40	70
Tamalco silt loam, 4 to 7 percent slopes, eroded	37	49	17	20	20	24	1.4	2.3	75	115	35	65
Terril loam, 2 to 5 percent slopes	73	90	31	36	36	43	3.0	4.3	150	210	100	145
Velma loam, 4 to 7 percent slopes	60	71	25	28	29	34	2.4	3.6	120	175	80	115
Velma loam, 4 to 7 percent slopes, eroded	54	66	22	25	26	31	2.2	3.4	110	165	70	105
Velma loam, 7 to 12 percent slopes	56	68	24	27	27	32	2.3	3.5	115	170	75	110
Velma loam, 7 to 12 percent slopes, eroded	50	61	20	23	24	28	2.0	3.1	105	155	65	100
Velma loam, 12 to 18 percent slopes					25	29	2.1	3.3	110	160	70	105
Velma-Walshville complex, 4 to 7 percent slopes, eroded	43	53	18	20	21	25	1.7	2.7	90	130	55	85
Velma-Walshville complex, 7 to 12 percent slopes, eroded	40	49	16	18	19	22	1.6	2.6	85	120	55	80
Virden silty clay loam	78	95	34	38	36	44	3.1	4.1	155	215	105	150
Weir silt loam	65	75	25	29	31	36	2.4	3.4	115	165	80	105

[1] A term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. For example an acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60 animal-unit-days.

are privately owned, and that one is municipally owned.

Most of the wooded areas are in the southern and central parts of the county along West, Middle, and East Forks of Shoal Creek and along Dry Fork and Ramsey Creeks and their tributaries. Wooded areas consist mainly of Hickory, Hosmer, Stoy, Weir, and Lawson soils but some other soils are occupied by scattered wooded tracts.

The present wooded tracts are generally poorly managed and mostly do not contain enough desirable species for high yields. Most of the wood now cut is sawed into lumber for local use, and some native timber is also used for posts and firewood. Most veneer logs and cooperage stocks are shipped to other States. The wood products used locally are processed mainly at sawmills located at Witt, at Hillsboro, and at a point 4 miles south of Hillsboro.

The soils that should be used for trees will be naturally reforested with desirable trees if a suitable source of seed is available. Where no suitable source of seed is available, planting desirable kinds of trees brings the soils back into production. Records kept over a long period of time show that about 60 acres of trees, on the average, is planted annually and that the main kinds of planted trees are conifers. Red pine and jack pine are the principal species planted, but some plantations of Scotch pine have been established. The Scotch pines are sold for Christmas trees.

Forest types

Forest types consist of stands of trees similar in composition and development. In general, they vary according to differences in the site.

The *oak-hickory type* is the more extensive of the two types in Montgomery County. Wooded tracts consisting of this type occupy well-drained soils, and they consist primarily of black oak, white oak, hickory, red oak, American elm, red elm, and white ash. Minor species are shingle-oak, black walnut, black cherry, bur oak, Osage-orange, black locust, honey locust, and post oak. Post oak commonly grows on the more nearly level, poorly drained soils, and the areas in which they grow are called post oak flats.

Trees of the *bottom-land hardwoods type* grow on the flood plains of the major streams throughout the county. They are important for producing timber because they generally grow on soils that are highly productive. The principal kinds of trees of this type are silver maple, elm, cottonwood, sycamore, and some basswood. Minor species are swamp white oak, pin oak, willow, ash, black walnut, and hackberry.

Soil properties affecting production of trees

The soils of this county differ widely in suitability for trees, just as they vary in suitability for other crops. The soil factors that influence the growth of trees, however, are somewhat different from those that affect the growth of annual crops or pasture. Trees are a long-term crop. They normally require decades to mature, and the soils on which they grow normally do not receive lime or fertilizer to help tree growth. The combination of species, or forest types, that grow on a specific soil are determined chiefly by a combination of such factors as position, slope, exposure, soil moisture, and other properties of the soils. The combined effect of these factors on the growth of trees determines the quality of the site.

Among the more important factors that affect the productive capacity of a soil for growing trees is the capacity of the soil to maintain an adequate moisture supply and to permit the development of an adequate root system. The moisture-supplying capacity of a soil, in turn, is influenced by its depth, texture, permeability, aeration, and depth to the water table. Other significant soil characteristics that affect the growth of trees are the texture and thickness of the surface layer and subsoil, the supply of plant nutrients, and the reaction (pH) of the soil. Some soils in the county have a high pH in the subsoil, caused by a high content of exchangeable sodium. Pines will not grow on these alkaline soils, or they make only poor growth.

Erosion reduces the thickness of the favorable surface layer, and it also reduces the capacity of the soil to store moisture, causes increased runoff, and lowers the amount of water that is absorbed. Natural reproduction of trees is likely to be adversely affected by severe erosion.

Woodland suitability grouping

Management of woodland can be planned more effectively if soils are grouped according to those characteristics that affect the growth of trees and management of the stand. For this reason, the soils of Montgomery County have been placed in seven woodland suitability groups. The soils most suitable for growing trees have been placed in woodland suitability groups 1 through 6, based on detailed studies of the characteristics of the soils and on information about the response of the soils to woodland use and management. Each group is made up of soils that require similar management and that have about the same potential productivity for wood crops. Productivity is shown in terms of site index and expected number of board feet of timber produced for named species based on the International scale (*22*). The number of board feet to be expected, as determined by the International scale, is based on an 80-year rotation.

The soils that were developed under grass and that are generally more suitable for farming than for trees are placed in woodland suitability group 7 on the basis of their characteristics. Since practically no trees now grow on the soils of group 7, the only information furnished for that group is the names of the series involved.

Information on woodland suitability groups was obtained from many sources. A main source consisted of two publications of the Illinois Technical Forestry Association (*11*, *12*). Information from these publications was supplemented by local studies made of the growth rate of trees growing on a number of different soil types. These studies were made cooperatively by John Sester, farm forester, University of Illinois Cooperative Extension Service, and soil scientists of the Soil Conservation Service.

In the woodland suitability groups, the characteristics of the soils in the group are described first. Then, information about species suitability or species to favor in existing stands is given. This is followed by the estimated range in site index, estimated potential production by board feet, and species to favor for planting. Ratings for certain limitations, and for hazards that affect management, are also included. Among these are ratings for plant competition, seedling mortality, equipment limitations, and erosion hazard. The names of the soils in each woodland group can be determined by referring to the "Guide to Mapping Units" at the back of this soil survey. Following are explanations of the ratings given.

Site Index.—This is the average height, in feet, of the dominant and codominant trees of a given species at a specified age. For upland oaks, it is the height obtained at 50 years of age, and for eastern cottonwood, it is the height attained at 30 years of age. By determining the site index, the potential production in board feet per acre can be estimated (*4*,*22*).

Limitations and Hazards.—Important limitations of soils used for trees, and hazards involved when the soils are used for trees, have been given ratings of *slight*, *moderate*, or *severe*. These ratings direct attention to the different kinds of management practices that are needed in managing wooded tracts and the intensity with which these practices must be applied. Following are definitions of these limitations and hazards.

Plant competition refers to the rate at which unwanted trees, shrubs, and weeds are likely to invade a site where an opening has been made in the canopy by fire, cutting, or other factors. This competition hinders the establishment and growth of desirable trees. A rating of *slight* indicates that competition from other plants is no special problem. A rating of *moderate* indicates that competition from other plants does not ordinarily prevent the establishment of an adequate stand of the desired species of trees. Developing a fully stocked stand may be delayed, however, because the seedlings take longer to become established and their initial growth is slowed. A rating of *severe* indicates that competition from other plants prevents desirable trees from restocking naturally. If seedlings are planted, competing plants must be controlled.

Seedling mortality refers to the expected loss of natural or planted tree seedlings as a result of soil characteristics or topographic features, not as a result of plant competition. It is assumed that the natural supply of seed is adequate, that the stock is good, that the seedlings are properly planted and cared for, and that other environmental factors, such as climate, are normal. In Montgomery County a rating of *slight* with regard to seedling mortality has been given to all the soils, indicating that ordinary losses do not amount to more than 25 percent of the planted stock.

Equipment limitation depends on soil characteristics and topographic features that restrict the use of equipment in planting, tending, or harvesting trees. For stands of trees on most of the soils in the county, the equipment limitation is rated as *slight*, which indicates that there is little or no restriction on the type of equipment or on the time of year the equipment can be used. The use of equipment may be limited somewhat while the soil is thawing after a freeze in winter, however, or for short periods after a heavy rainfall. A rating of *moderate* indicates that the use of equipment is restricted because the slopes are steep, or because the soils are wet for periods of up to 3 months. Where the slopes are short and steep, farm tractors and long chains are needed for conducting logging operations. A rating of *severe* indicates that the use of equipment is restricted because of very steep or long slopes that require special harvesting methods, or because, for more than 3 months during the year, the soils are too wet for the use of equipment. In an area northeast of Litchfield, for example, the equipment limitation is rated as severe because some of the slopes are steep and long. In that area track-type equipment may be needed for the most efficient operation.

Erosion hazard refers to the potential risk of erosion if the site is managed according to acceptable standards for woodland use. Factors that influence these risks are the length and steepness of the slopes and the characteristics of the surface layer and subsoil. The ratings given for erosion hazard—*slight*, *moderate*, and *severe*—are based on the increasing risk of erosion that could be incurred in managing or harvesting a crop of trees. The hazard of erosion is generally related to the layout, use, and care of woods, roads, and skid trails, or to cultural practices that expose the soil.

WOODLAND SUITABILITY GROUP 1

This group consists of deep, moderately well drained and well drained soils of the Camden, Hennepin, Hickory, Negley, Pike, and Sicily series. These soils are nearly level to very steep and are on uplands and stream terraces. Their surface layer is medium textured and is light colored or moderately dark colored. Their subsoil is moderately fine textured. Permeability is moderate, and both the ability to supply nutrients to plants and the available moisture capacity are moderate to high. Reaction is generally medium acid, but the Hennepin soils have an alkaline subsoil. Before those soils are used for plantations of pines, they should be tested at the specific site to see if they are suitable.

White oak and northern red oak are the species to favor in improving the present stands, and they are the most valuable trees now growing on the soils. Other species to favor are white ash, black oak, sugar maple, and black cherry.

For upland oaks the site index ranges from 55 to 70. The annual potential yield of upland oaks ranges from 160 to 265 board feet per acre.

Yellow-poplar, northern red oak, white oak, white ash, red pine, and white pine grow well if they are planted on these soils. Scotch pine is suitable only for growing as Christmas trees.

Plant competition ranges from moderate to severe. It is severe in some of the gently sloping to rolling areas. In those areas several weedings are necessary for adequate restocking to take place. On the steeper slopes, competition is moderate. It does not prevent a fully stocked stand of desirable trees from becoming established, but natural regeneration is delayed. Also, one or two weedings are necessary for the survival of desirable seedlings.

Seedling mortality is slight, and the expected loss of seedlings is less than 25 percent. Abandoned eroded areas should be planted to pines rather than hardwoods.

The hazard of erosion is slight on the gently sloping soils. The hazard increases as the slope becomes steeper.

Equipment limitations are moderate on the steeper slopes. Care is needed in conducting logging operations and in constructing roads.

WOODLAND SUITABILITY GROUP 2

In this group are moderately well drained soils of the Hosmer and O'Fallon series that are moderately deep over a fragipan. These soils have a light-colored or moderately dark colored, medium-textured surface layer and a moderately fine textured subsoil. The upper part of their profile is moderately permeable, but the brittle, compact fragipan at a depth of 25 to 35 inches is very slowly permeable. The soils are on uplands and are gently sloping to rolling. They are very strongly acid, are low in natural fertility, and have moderate to high available moisture capacity. Response is good to proper management.

White oak, northern red oak, and black walnut are the species to be favored when improvement cuttings are made, and they are the most valuable species now growing in the wooded areas. Other species to be favored are black oak and black cherry.

For upland oaks the site index ranges from 60 to 75. The annual potential yield of upland oaks ranges from 195 to 300 board feet per acre.

Red pine (fig. 12) and white pine grow well if they are planted on these soils, and Scotch pine is suitable for planting for Christmas trees. Black locust is suitable for helping to control erosion or for use in stabilizing areas that are already eroded.

Plant competition is moderate but usually does not prevent an adequate stand from becoming established. The initial growth of desirable species can be retarded by competition from undesirable species and other plants.

Seedling mortality is slight. Ordinarily, adequate natural regeneration takes place in areas that are not severely eroded. Care is necessary if severely eroded, sloping areas are to be prepared for planting. In the severely eroded areas, the first plantings of pine seedlings are more productive than plantings of hardwoods because the soils are better suited to pines than to hardwoods, and pines have a better survival rate.

Figure 12.—**Small plantation of red pine on a Hosmer soil of woodland suitability group 2.**

Equipment limitations are slight. Erosion is not a serious hazard on the gently sloping soils, but the hazard increases as the steepness of the slope increases. On the stronger slopes, logging operations and the construction of roads should be done on the contour.

WOODLAND SUITABILITY GROUP 3

This group consists of deep, light-colored to moderately dark colored, nearly level to sloping soils of the Clarksdale, Blair, and Stoy series. These soils are on the uplands. They are strongly acid and have a medium-textured surface layer and a moderately fine textured subsoil. Permeability is moderately slow or slow, and the available moisture capacity is moderate to high. Natural fertility of the Clarksdale soil is high, but it is medium in the Blair soils and low in the Stoy.

Species to be favored for managing in the existing stands are white oak, black oak, northern red oak, basswood, and shingle oak.

For upland oaks the site index ranges from 60 to 70. The annual potential yield of upland oaks ranges from 195 to 265 board feet per acre.

Red pine, jack pine, and white ash grow well if they are planted on these soils. Scotch pine is suitable for growing as Christmas trees.

Plant competition is moderate. Normally, it does not prevent desirable species from becoming established, but it can delay the natural regeneration of desirable trees and slow their initial growth.

Seedling mortality is slight, and adequate natural regeneration generally takes place. Sassafras, hickory, and other less desirable species should be eliminated wherever more desirable species, for example white oak and ash, can be favored.

The hazard of erosion is slight on the Clarksdale and Stoy soils, but it is greater on the Blair soils, especially until trees and other woodland plants become established.

WOODLAND SUITABILITY GROUP 4

Weir silt loam, the only soil in this group, is deep, poorly drained, and slowly permeable. It is a nearly level soil of the uplands. The surface layer is light colored and medium textured, and the subsoil is moderately fine textured or fine textured. This soil is strongly acid, has moderate available moisture capacity, and is low in natural fertility.

Post oak, black oak, and white oak are the species to favor in the present stands. They are the most common trees now growing on this soil.

For upland oaks the site index ranges from 46 to 57. The annual potential yield of upland oaks ranges from 75 to 160 board feet per acre.

Plant competition is moderate. It does not prevent an adequate stand of desirable species from becoming established.

Seedling mortality is generally slight. Ordinarily, adequate natural regeneration takes place.

At times, for periods of nearly 3 months, equipment used in managing woodland cannot be used when an abnormally large amount of rainfall has been received.

Erosion is not a hazard. This soil has a limited root zone, however, which adversely affects the growth and stability of trees, especially conifers.

WOODLAND SUITABILITY GROUP 5

This group consists of deep, light-colored to dark-colored, somewhat poorly drained soils of the Nokomis, Racoon, and Starks series. These soils are nearly level or gently sloping and are on stream terraces. They have a medium-textured surface layer and a moderately fine textured subsoil. Soil reaction ranges from strongly acid for the Racoon soil to slightly acid for the Nokomis and Starks. Permeability is moderately slow. The available moisture capacity and ability to supply nutrients to plants are medium to high.

White oak, northern red oak, black oak, bur oak, and white ash are the species to favor when the stand of trees is improved. They are among the most productive trees that grow on these soils.

For upland oaks the site index ranges from 67 to 74. The annual potential yield of upland oaks ranges from 230 to 300 board feet per acre.

In addition to white oak, northern red oak, black oak, bur oak, and white ash, tulip-poplar, sycamore, cottonwood, red pine, and white pine grow well if they are planted on these soils.

Plant competition is moderate. It usually does not prevent desirable species from becoming established, but it can delay the natural regeneration of desirable trees and slow their initial growth.

Seedling mortality is slight. Ordinarily, adequate natural regeneration will take place.

Equipment limitations are slight. Except for rather short periods after rains, work can be done any time of the year.

Erosion is not generally a hazard on these nearly level to gently sloping soils.

WOODLAND SUITABILITY GROUP 6

In this woodland group are deep, dark-colored, medium-textured and moderately coarse textured soils that occur on bottom lands. These soils are in the Landes, Lawson, and Radford series. They are somewhat poorly drained and are slightly acid to neutral in reaction. The Lawson and Radford soils are moderately permeable and have high available moisture capacity. The Landes soil is rapidly permeable and has moderate to low available moisture capacity. The capacity to supply nutrients to plants is high for the Lawson and Radford soils and moderately high for the Landes soil.

Cottonwood, sycamore, and black walnut grow rapidly on these soils and are the species to favor when the stand of trees is improved. White ash and cherrybark oak are other species to favor, and tulip-poplar, cypress, and sweetgum also grow well.

On the soils of this group, the site index for cottonwood is approximately 90. These soils are the most productive of wood crops of any in the county. Cottonwood, which grows in pure stands in places, makes the most rapid growth of any of the bottom-land hardwoods. More than 400 board feet per acre of lumber from cottonwood is produced each year, and at times, the annual yield exceeds 800 board feet per acre. Scattered areas of bottom lands, too small for economical use for farming, could be better used for growing cottonwoods. Because pines have low tolerance for soils that are neutral or alkaline in reaction, they do not grow well on these soils.

Plant competition from weeds, vines, low-growing shrubs, and grass ranges from severe, where only occasional flooding takes place, to moderate, where flooding is frequent. Moderate competition from unwanted plants delays natural regeneration and slows the initial growth of trees. Usually, it does not prevent an adequate stand of desirable species from becoming established.

Seedling mortality is slight on these soils for most kinds of trees that are adapted to the climate and soils.

Equipment limitations are moderate. Generally, machinery can be used for 8 months each year without serious damage to the roots of trees or to the structure of the soils. The use of equipment is somewhat limited for about 3 months during many spring seasons. These soils are not subject to erosion.

WOODLAND SUITABILITY GROUP 7

The soils of this group are generally cultivated, and for that reason they are not likely to be used as woodland. Some of the soils would be favorable sites for trees, and others would not. If planting of trees is contemplated, it would be necessary to refer to the following series in the section "Descriptions of the Soils" to learn about the characteristics of the soils.

Chauncey.	Harvel.	Pana.
Cisne.	Herrick.	Shiloh.
Colo.	Hoyleton.	Tamalco.
Cowden.	Huey.	Terril.
Douglas.	Ipava.	Velma.
Ebbert.	Oconee.	Virden.
Harrison.	Piasa.	Walshville.

Planting of trees

The slope, aspect, present vegetation, and kinds of soils are the primary factors to consider when choosing the kinds of trees to plant. Different kinds of trees vary in their requirements. For example, pines generally grow better on drier, shallower, more acid, and more compact soils than do hardwoods, and they grow in more exposed areas. Their growth is less rapid on these poorer sites, however, than on the more favorable sites. Because some strongly acid soils and alkaline soils occur in such a complex pattern, the soils should be tested before trees are planted so that the areas suitable for planting can be determined.

The most important factors that affect the productive capacity of a soil for growing trees is the capacity of that soil to maintain aeration and to permit the development of an adequate root system. Other soil characteristics that influence the growth of trees are the texture, depth, and consistence of the permeable soil material, and drainage, depth to the water table, and reaction. Pines, for example, do not grow or make only poor growth on alkaline soils. Cottonwoods and sycamores thrive on the soils of bottom lands where the supply of moisture is plentiful, but they do not grow or make only poor growth on dry soils of the uplands. A soil that formerly supported a specific kind of tree may not do so at present, because of soil changes, such as erosion.

The planting information in the descriptions of the woodland suitability groups will assist the reader in choosing the kinds of trees to plant in a given area. More exact information can be obtained by consulting the local forester.

Use of the Soils for Engineering

Some soil properties are of special interest to engineers because they affect the construction and maintenance of engineering projects. The soil properties most important to engineers are grain size, plasticity, compaction characteristics, permeability, soil drainage, reaction, content of organic matter, and shrink-swell characteristics. Also important are susceptibility to flooding, depth to bedrock, and relief.

The information in this soil survey provides a guide for engineers, not a complete manual. Its main value is for making preliminary studies of land use and soil properties important to construction and engineering uses. The information in the survey, for example, can be used to make preliminary estimates of the engineering properties of the soils if a flood-prevention structure, agricultural drainage system, farm pond, or irrigation system is planned, or if diversion terraces or waterways are to be constructed. This information can also be used if a site is to be selected for a highway, airport, industry, business, residence, or recreational area; if the suitability of the soils for cross-country movement of vehicles and construction equipment needs to be determined; or if probable sources of gravel and sand need to be located.

With the use of the soil map for identification, the engineering interpretations reported here can be useful for many purposes. It should be emphasized that they do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and excavations deeper than the depth of the layers here reported. Even in these situations, the soil survey may be useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Other information useful for engineering purposes can be obtained from the soil map. The distribution of different soils is shown on the map, for example, and general relief can be inferred from the slopes indicated in the names of the mapping units. It is often necessary, however, to refer to other parts of the survey. By using information obtained from the soil map, from the descriptions of the profiles given in the section "Description of the Soils," and from the tables given in this subsection, the soils engineer can plan a detailed investigation of the soils at the site of construction.

294-384—69——5

In places the mapping units shown on the soil map include small areas of a different kind of soil material. These inclusions are as large as 2 acres in size but are too small to be shown separately on the soil map. Normally, they are not significant for farming, but they can be important in engineering.

Some of the terms used by the soil scientists may be unfamiliar to the engineer, and some words—for example, soil, clay, silt, sand, and aggregate—may have special meaning in soil science. These terms, as well as other special terms, are defined in the Glossary at the back of this soil survey.

Much of the information in this section is given in the tables. Table 6 gives engineering test data obtained when samples of soils from selected soil series were tested. Table 7 gives estimates of the properties of the soils, and table 8 provides engineering interpretations for these properties.

Engineering classification systems

Two systems of classifying soils are in general use among engineers. Both of these classification systems are described briefly in the following paragraphs. Additional information is given in the PCA Soil Primer (*21*).

AASHO Classification System.—Most highway engineers classify soil materials in accordance with the system approved by the American Association of State Highway Officials (AASHO) (*1*). In this system soil materials are classified in seven basic groups that range from A–1 (gravelly soils of high bearing capacity, the best soils for subgrade) to A–7 (clayey soils having low strength when wet, the poorest soils for subgrade). Within each basic group, the relative engineering value of the soil material is indicated by a group index number. Group index numbers range from 0 for the best material to 20 for the poorest. The group index numbers of the soils tested are shown in parentheses following the basic group symbol in table 6. The estimated AASHO classifications for the soils of Montgomery County are given in table 7.

Unified Classification System.—Some engineers prefer to use the Unified soil classification system originally developed for the Corps of Engineers, U.S. Army (*26*). The soils are classified under that system according to texture, plasticity, and performance as engineering construction material. In that system soil materials are identified as coarse grained (eight classes), fine grained (six classes), or highly organic. A letter symbol and a descriptive name are used to indicate the principal characteristics of a given class.

The symbols and their meanings are G, gravel; S, sand; M, silt; C, clay; O, organic silts and clays; Pt, peat and other highly organic soils; W, well-graded material; P, poorly graded material; L, fine-grained material that has a low liquid limit; and H, fine-grained material that has a high liquid limit. Thus, a soil that has a Unified classification of SP is a poorly graded sand. A soil that has a classification of ML is a silty soil that has a low liquid limit (50 or less).

Table 6 shows the Unified classifications of the soils that were tested. The estimated Unified classifications for the soils of this county are given in table 7.

Test data

Table 6 shows test data for several soil types that occur in Montgomery County. The results of the testing, how-

TABLE 6.—*Engineering*

Soil type and location of sample	Parent material	Report number	Depth	Moisture-density data [2]	
				Maximum dry density	Optimum moisture
			Inches	*Percent*	*Percent*
Douglas silt loam:					
T. 9 N., R. 2 W., sec. 22, SE160, SE40, NW. corner; thence 150 feet south and 30 feet east. (Modal profile)	Loess overburden on paleosol in Illinoian glacial drift.	64–373	0–8	108	17
		64–374	15–21	104	20
		64–375	28–38	108	18
T. 10 N., R. 1 W., sec. 2; 150 feet south and 95 feet east of the NW. corner of the section. (Profile developed in shallow loess)	Loess overburden on paleosol in Illinoian glacial drift.	64–370	0–10	103	19
		64–371	17–30	104	21
		64–372	58–78	124	11
Lawson silt loam:					
T. 9. N., R. 3 W., sec. 21, SE160, SW40, SW10; 60 feet west and 25 feet north of road bridge. (Modal profile)	Silty alluvium.	64–368	0–18	112	14
		64–369	18–39	111	16
Oconee silt loam:					
T. 9 N., R. 2 W., sec. 13, NE160, NW40, NE. corner; thence west 417 feet and south 88 feet. (Modal profile)	Loess.	64–382	0–8	106	17
		64–383	8–14	108	16
		64–384	19–30	97	21
T. 10 N., R. 4 W., near center of sec. 29. Reached by going from center of junction of State Highway No. 127 and oiled road, 350 feet east on the oiled road, and 10 feet south of the south edge of the road right-of-way. (Modal profile)	Loess.	64–385	0–9	104	18
		64–386	17–29	95	25
		64–387	39–50	110	17
Stoy silt loam:					
T. 8 N., R. 4 W., sec. 17, SW160, NW40, NE. corner; thence 200 feet south and 420 feet west or reached by going north of the road to a point 294 feet east of woods boundary. (Modal profile)	Loess.	64–365	3–10	107	17
		64–366	17–23	102	20
		64–367	51–58	107	18
Tamalco silt loam:					
T. 9 N., R. 4 W., sec. 26, NE160, NW40, NE. corner; thence 767 feet west and 78 feet south. (Modal profile)	Loess.	64–388	0–6	104	19
		64–389	11–17	96	23
		64–390	17–28	102	21
		64–391	42–54	118	14
T. 7 N., R. 2 W., sec. 17, NW160, SW40, SW. corner of 40; thence 40 feet north and 35 feet east (Nonmodal profile)	Loess.	64–392	0–8	104	17
		64–393	14–23	95	25
		64–394	23–34	109	17
		64–395	34–50	114	15
Walshville loam:					
T. 7 N., R. 5 W., sec. 2, SE160, SW40, SE. corner; thence 480 feet west along north side of right-of-way of new road. (Modal profile)	Illinoian till and has a paleosol in the till in many places.	64–379	0–7	111	15
		64–380	15–22	101	19
		64–381	31–44	118	14
T. 10 N., R. 5 W., sec. 33, NW160, SW. corner; thence 180 feet north and 45 feet east. (Nonmodal profile)	Illinoian till and has a paleosol in the till in many places.	64–376	0–11	112	15
		64–377	14–21	99	23
		64–378	30–46	115	16

[1] Tests performed by the Illinois Division of Highways, Bureau of Materials, Springfield, Ill.
[2] Based on AASHO Designation T 99–57, Method (*1*).
[3] Mechanical analyses according to AASHO Designation T 88–57 (*1*). Results by this procedure frequently differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soils.

test data[1]

Mechanical analysis[3, 4]							Liquid limit	Plasticity index	Classification	
Percentage passing sieve—			Percentage smaller than—						AASHO	Unified
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
100	99	98	94	67	30	20	28	8	A-4(8)	CL
------	100	99	91	77	41	36	52	28	A-7-6(18)	CH
------	100	99	94	74	36	30	48	25	A-7-6(16)	CL
100	98	93	88	62	29	21	34	10	A-4(8)	ML
------	100	99	96	76	40	29	49	25	A-7-6(16)	CL
89	72	43	41	32	18	13	22	6	A-4(2)	SM-SC
100	98	82	74	52	22	12	27	8	A-4(8)	CL
99	96	76	70	54	24	14	29	9	A-4(8)	CL
100	98	94	84	30	24	20	30	8	A-4(8)	CL
100	97	94	85	32	26	22	29	9	A-4(8)	CL
100	99	98	93	76	49	43	72	45	A-7-6(20)	CH
100	98	94	67	58	24	21	28	7	A-4(8)	ML-CL
100	100	99	96	82	52	41	70	43	A-7-6(20)	CH
100	99	96	92	76	34	23	49	29	A-7-6(17)	CL
100	96	93	87	65	26	18	31	11	A-6(8)	CL
100	98	95	92	74	43	34	51	25	A-7-6(16)	CL-CH
------	100	99	93	73	38	27	42	22	A-7-6(13)	CL
100	96	93	84	59	26	19	30	7	A-4(8)	ML
100	99	98	93	78	53	42	71	43	A-7-6(20)	CH
100	99	97	92	76	47	32	61	36	A-7-6(20)	CH
100	95	81	74	52	25	16	30	13	A-6(9)	CL
100	96	93	88	54	20	13	28	7	A-4(8)	ML-CL
------	100	99	96	82	53	45	68	37	A-7-5(20)	CH
------	100	99	88	78	42	31	51	29	A-7-6(18)	CL-CH
100	99	96	91	68	33	28	33	15	A-6(10)	CL
100	94	76	70	60	20	15	25	6	A-6(8)	ML-CL
97	90	70	63	57	46	43	69	46	A-7-6(18)	CH
94	81	56	50	44	30	28	47	30	A-7-6(13)	CL
100	95	78	70	47	24	20	28	9	A-4(8)	CL
98	95	80	75	64	48	40	68	43	A-7-6(20)	CH
99	91	68	64	52	34	26	46	28	A-7-6(14)	CL

[4] In the Douglas profile developed in shallow loess, 100 percent of the soil material between a depth of 58 and 78 inches passed a 1-inch sieve. In the modal profile of the Lawson soil, 100 percent of the soil material between a depth of 18 and 39 inches passed a No. 4 sieve. In the modal profile of the Walshville soil, 100 percent of the soil material between a depth of 15 and 22 inches passed a ¾-inch sieve and 100 percent of the soil material between a depth of 31 and 44 inches passed a 1-inch sieve. In the nonmodal profile of the Walshville soil, 100 percent of the soil material between a depth of 14 and 46 inches passed a ⅜-inch sieve.

TABLE 7.—*Estimated*

[Lack of information

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Blair (5C2, 5C3[1])	3–5	0–7	Silt loam to loam	ML or CL	A–4 or A–6
		7–60	Clay loam	CL	A–6
Camden (134B, 134C2)	5–10	0–8	Silt loam to loam	ML or CL	A–4
		8–40	Silty clay loam to clay loam	CL or CH	A–6 or A–7
		40–90	Stratified loam, silt loam, and sandy loam.	ML, CL, SM or SC	A–2, A–4, or A–6
Chauncey (287)	0–1	0–36	Silt loam	ML or CL	A–4
		36–60	Silty clay loam to silty clay	CL or CH	A–7
Cisne (2,991) For properties of the Huey soil in 991, refer to the Huey series.	0–1	0–21	Silt loam	ML or CL	A–4
		21–40	Silty clay loam to silty clay	CL or CH	A–7
		40–60	Silty clay loam	CL	A–6 or A–7
Clarksdale (257)	1–3	0–14	Silt loam	ML or CL	A–4 or A–6
		14–44	Silty clay loam	CL or CH	A–7 or A–6
		44–65	Silt loam to clay loam.	ML or CL	A–4 or A–6
Colo (402)	0–1	0–23	Silty clay loam	CL, CH, or MH	A–7
		23–58	Mainly silty clay loam but contains strata of other textures.	CL	A–6 or A–7
Cowden (112, 993A, 993B2) For properties of the Piasa soils in 993A and 993B2, refer to the Piasa series.	0–1	0–19	Silt loam	ML or CL	A–4
		19–45	Silty clay loam to silty clay	CL or CH	A–7
		45–57	Silt loam	ML or CL	A–4 or A–6
Douglas (128B, 128C, 128C2, 128D)	([3])	0–11	Silt loam	ML or CL	A–4
		11–48	Silty clay loam	CL	A–6 or A–7
		48–70	Sandy loam to loam	SM, SC, or ML	A–4 or A–6
Ebbert (48)	0–1	0–24	Silt loam	ML or CL	A–6
		24–48	Silty clay loam	CH	A–7
		48–72	Silt loam to clay loam	ML or CL	A–6 or A–7
Harrison (127A, 127B, 127B2, 127C, 127C2)	3–5	0–15	Silt loam	ML or CL	A–6
		15–43	Silty clay loam	CL	A–6 or A–7
		43–60	Silt loam to silty clay loam	ML or CL	A–4 or A–6
Harvel (252)	0–1	0–10	Silty clay loam	CL	A–7
		10–56	Silt loam or silty clay loam	CL or ML	A–7 or A–6
		56–65	Clay loam to silt loam	CL	A–6
Hennepin	([3])	0–12	Loam	ML	A–4
		12–60	Loam to sandy loam	ML or SM	A–4 or A–2
Herrick (46, 995)	1–3	0–16	Silt loam	ML or CL	A–4 or A–6
		16–54	Silty clay loam	CH	A–7
		54–65	Silt loam	CL	A–6
Hickory (8D, 8D2, 8E, 8E2, 8F, 8G, 8D3,[1] 8E3, 997F, 997G, 998F). For properties of the Hennepin soils in 997F and 997G, refer to the Hennepin series; for properties of the Negley soil in 998F, refer to the Negley series.	([3])	0–10	Loam	ML or CL	A–4 or A–6
		10–42	Clay loam to loam	CL	A–6
		42–60	Loam to sandy loam	ML, CL, or SM	A–4
Hosmer (214B, 214C, 214C2, 214D2, 214C3,[1] 214D3.[1])	5–10	0–11	Silt loam	ML or CL	A–4
		11–28	Silty clay loam	CL	A–6 or A–7
		28–50	Silt loam to silty clay loam	ML or CL	A–6 or A–7
		50–68	Silt loam	ML or CL	A–4 or A–6

See footnotes at end of table.

properties of soils

indicates not applicable]

Percent passing sieve— No. 4 (4.7 mm.)	Percent passing sieve— No. 10 (2.0 mm.)	Percent passing sieve— No. 200 (0.074 mm.)	Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential for metal conduits
			Inches per hour	*Inches per inch of soil depth*	*pH*		
95–100	90–100	85–100	0. 63–2. 00	0. 20–0. 25	5. 6–6. 5	Low to moderate	
95–100	90–95	60–80	0. 20–0. 63	0. 16–0. 19	5. 1–5. 5	Moderate	High.
100	95–100	80–95	0. 63–2. 00	0. 20–0. 25	5. 6–6. 5	Low to moderate	
95–100	90–100	60–90	0. 63–2. 00	0. 16–0. 19	5. 1–6. 5	Moderate	Moderate.
90–100	80–95	30–80	0. 63–2. 00	0. 12–0. 16	5. 1–7. 0	Low to moderate	Moderate.
100	95–100	95–100	0. 20–0. 63	0. 20–0. 25	5. 1–6. 0	Low to moderate	
100	95–100	90–95	0. 06–0. 20	0. 15–0. 19	5. 6–6. 5	Moderate to high	High.
100	95–100	95–100	0. 20–0. 63	0. 20–0. 25	4. 5–5. 0	Low to moderate	
100	95–100	90–95	[2]	0. 18–0. 23	4. 5–5. 0	High	High.
100	90–100	80–95	0. 20–0. 63	0. 18–0. 21	5. 6–7. 8	Moderate to high	High.
100	100	95–100	0. 63–2. 00	0. 20–0. 25	5. 1–6. 0	Low to moderate	
100	100	95–100	0. 20–0. 63	0. 19–0. 21	5. 1–6. 5	High	High.
100	100	95–100	0. 20–0. 63	0. 18–0. 23	5. 6–7. 3	Low to moderate	High.
100	95–100	90–100	0. 63–2. 00	0. 19–0. 23	6. 1–7. 3	High	
95–100	90–100	80–100	0. 63–2. 00	0. 19–0. 21	6. 1–7. 3	Moderate to high	High.
100	100	95–100	0. 20–0. 63	0. 20–0. 25	5. 1–6. 0	Low to moderate	
100	100	95–100	0. 06–0. 20	0. 15–0. 19	5. 6–6. 5	Moderate to high	High.
100	100	95–100	0. 06–0. 20	0. 18–0. 23	5. 6–7. 8	Low to moderate	High.
100	100	95–100	0. 63–2. 00	0. 20–0. 25	5. 6–6. 5	Low to moderate	
100	100	95–100	0. 63–2. 00	0. 19–0. 23	5. 1–6. 0	Moderate	Moderate.
100	90–100	40–70	0. 63–2. 00	0. 14–0. 16	5. 6–6. 0	Moderate to low	Moderate.
100	100	95–100	0. 63–2. 00	0. 20–0. 25	5. 6–6. 0	Low to moderate	
100	100	95–100	0. 06–0. 63	0. 19–0. 23	5. 6–7. 3	Moderate to high	High.
100	90–100	80–95	0. 06–0. 63	0. 18–0. 23	5. 6–7. 3	Moderate	High.
100	100	95–100	0. 63–2. 00	0. 20–0. 25	5. 6–6. 5	Moderate	
100	100	95–100	0. 63–2. 00	0. 19–0. 23	5. 6–6. 5	Moderate to high	Moderate.
100	95–100	90–95	0. 20–2. 00	0. 18–0. 20	6. 6–7. 3	Low to moderate	Moderate.
100	100	95–100	0. 63–2. 00	0. 20–0. 25	6. 6–7. 3	Moderate	
100	100	95–100	0. 63–2. 00	0. 18–0. 23	6. 6–7. 3	Moderate	High.
95–100	90–100	80–90	0. 63–2. 00	0. 18–0. 23	6. 5–7. 8	Moderate	High.
90–100	90–100	50–80	0. 63–2. 00	0. 14–0. 18	6. 6–7. 8	Low	Low.
90–100	85–100	30–70	0. 63–2. 00	0. 12–0. 14	[4] 7. 4–8. 3	Low	Low.
100	100	95–100	0. 63–2. 00	0. 20–0. 25	5. 1–6. 0	Low to moderate	
100	100	95–100	0. 20–0. 63	0. 19–0. 23	5. 1–6. 0	High	High.
100	100	95–100	0. 20–0. 63	0. 18–0. 23	5. 6–6. 5	Moderate	High.
95–100	90–100	50–80	0. 63–2. 00	0. 16–0. 20	4. 5–5. 5	Low to moderate	
95–100	90–100	55–85	0. 63–2. 00	0. 16–0. 20	4. 5–5. 5	Moderate	Moderate.
95–100	90–100	40–80	0. 63–2. 00	0. 10–0. 14	5. 6–7. 8	Low to moderate	Moderate.
100	100	95–100	0. 63–2. 00	0. 20–2. 00	5. 1–6. 0	Low to moderate	
100	100	95–100	0. 63–2. 00	0. 19–0. 23	4. 5–5. 5	Moderate	Moderate.
100	100	95–100	0. 06–0. 20	[5]	4. 5–5. 5	Moderate	Moderate.
100	95–100	90–100	0. 20–0. 63	[5]	5. 1–6. 0	Low to moderate	Moderate.

TABLE 7.—*Estimated*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Hoyleton (3A, 3B, 3B2, 992B)	1–3	0–11	Silt loam	ML or CL	A–4
For properties of the Tamalco soil in 992B, refer to the Tamalco series.		11–37	Silty clay loam to silty clay	CL	A–6 or A–7
		37–60	Silt loam to silty clay loam	ML or CL	A–6 or A–7
Huey	0–1	0–10	Silt loam	ML or CL	A–4 or A–6
		10–33	Silty clay loam to silty clay	CL	A–6
		33–60	Silt loam	CL	A–6
Ipava (43)	1–3	0–17	Silt loam	ML or CL	A–6
		17–45	Silty clay loam to silty clay	CH or MH	A–6 or A–7
		45–60	Silt loam	ML or CL	A–6
Landes (304)	3–5	0–10	Fine sandy loam to sandy loam	SM or ML	A–4
		10–50	Loamy fine sand to fine sand	SM	A–2 or A–4
Lawson (451)	1–3	0–39	Silt loam or loam	ML or CL	A–4 or A–6
		39–53	Stratified silt loam and loam	ML or CL	A–4 or A–6
Negley	([3])	0–13	Loam to sandy loam	ML, CL, or SM	A–4
		13–48	Sandy clay loam to sandy loam	CL, ML, SC, or SM	A–4 or A–6
		48–109	Sandy loam to sandy clay loam	SM, SC, or ML	A–4 or A–6
Nokomis (586)	1–3	0–60	Loam to light silty clay loam	ML or CL	A–4 or A–6
Oconee (113A, 113B, 113B2, 113C, 113C2, 994A, 994B, 994B2, 994C2).	1–3	0–15	Silt loam	ML or CL	A–4
For properties of the Tamalco soils in 994A, 994B, 994B2, and 994C2, refer to the Tamalco series.		15–50	Silty clay loam to silty clay	CL or CH	A–6 or A–7
		50–60	Loam	ML or CL	A–4 or A–6
O'Fallon (114B)	5–10	0–12	Silt loam	ML or CL	A–4
		12–31	Silty clay loam	CL	A–6 or A–7
		31–44	Silty clay loam	ML or CL	A–6 or A–7
		44–60	Silt loam	ML or CL	A–4 or A–6
Pana (256C2, 256D2)	([3])	0–12	Silt loam to loam	ML or CL	A–4
		12–96	Gravelly clay loam	SC, GC, or CL	A–2 or A–4
		96–107	Stratified gravel and sand	GW, GC, SW, or SC	A–1 or A–2
Piasa	0–1	0–12	Silt loam	ML or CL	A–6 or A–7
		12–37	Silty clay loam to silty clay	CH	A–7
		37–62	Silt loam to silty clay loam	CL	A–7
Pike (583A, 583B, 583C, 583C2, 583D2)	([3])	0–10	Silt loam	ML or CL	A–4
		10–46	Silty clay loam to clay loam	CL	A–6 or A–7
		46–56	Silt loam to sandy loam	SM or ML	A–2 or A–4
Racoon (109)	0–1	0–24	Silt loam	ML	A–4
		24–60	Silty clay loam	CL or CH	A–6 or A–7
Radford (74)	1–3	0–24	Silt loam	ML or CL	A–4 or A–6
		24–60	Silty clay loam	CL	A–6
Shiloh (138, 138+[9])	0–1	0–36	Silty clay to silty clay loam	CH	A–7
		36–60	Heavy silt loam	MH or CH	A–6
Sicily (258B, 258C2)	5–10	0–11	Silt loam	ML or CL	A–6
		11–46	Silty clay loam	CL	A–6 or A–7
		46–68	Silt loam to silty clay loam	ML or CL	A–4 or A–6

See footnotes at end of table.

properties of soils—Continued

Percent passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential for metal conduits
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)					
			Inches per hour	*Inches per inch of soil depth*	*pH*		
100	95–100	95–100	0.63–2.00	0.20–0.25	4.5–5.0	Low to moderate	
100	95–100	90–100	0.06–0.20	0.18–0.20	4.5–5.5	Moderate to high	High.
100	90–100	80–95	0.20–0.63	0.16–0.18	6.1–7.3	Moderate	High.
100	95–100	95–100	0.20–0.63	0.20–0.25	5.6–6.5	Low to moderate	
100	95–100	90–100	([6])	[7] 0.12–0.15	7.9–9.0	Moderate to high	High.
100	90–100	80–95	0.06–0.20	[7] 0.15–0.18	7.9–9.0	Moderate to high	High.
100	100	95–100	0.63–2.00	0.23–0.27	5.6–6.5	Moderate	
100	100	95–100	0.63–2.00	0.20–0.25	5.6–6.5	Moderate to high	High.
100	100	95–100	0.63–2.00	0.18–0.23	6.1–7.8	Low to moderate	Moderate.
100	95–100	35–65	2.00–6.30	0.13–0.17	6.6–7.3	Low	
100	95–100	15–45	6.30–20.0	0.06–0.08	6.6–7.3	Low	Low.
100	95–100	80–100	0.63–2.00	0.20–0.25	6.6–7.8	Moderate	
95–100	85–95	55–95	0.63–2.00	0.16–0.20	6.6–7.8	Moderate	High.
95–100	90–95	40–70	2.00–6.30	0.12–0.14	5.1–6.5	Low	
95–100	90–100	40–70	2.00–6.30	0.14–0.18	5.0–6.5	Low	Moderate.
85–95	80–90	40–60	2.00–6.30	0.14–0.16	5.0–6.5	Low	Moderate.
90–100	85–95	60–90	0.63–2.00	0.16–0.19	6.1–7.3	Low to moderate	High.
100	100	95–100	0.20–0.63	0.20–0.25	5.1–6.5	Low to moderate	
100	100	95–100	0.06–0.20	0.15–0.18	5.1–6.5	Moderate to high	High.
100	70–80	60–75	0.20–0.63	0.15–0.18	5.6–7.8	Low to moderate	High.
100	100	95–100	0.63–2.00	0.20–0.25	6.1–6.5	Low to moderate	
100	100	95–100	0.63–2.00	0.18–0.23	4.5–5.5	Moderate	Moderate.
100	100	95–100	0.06–0.20	[5] 0.18–0.20	4.5–5.5	Moderate	Moderate.
100	95–100	90–100	0.06–0.20	([5])	4.5–6.0	Low to moderate	Moderate.
90–95	85–90	55–70	2.00–6.30	0.18–0.23	5.1–6.5	Low	Low.
65–90	60–85	30–60	2.00–6.30	0.14–0.18	5.6–6.0	Low	Low to moderate.
50–70	40–60	0–15	([8])	0.02–0.04	6.1–7.8	Low	Low.
100	95–100	95–100	0.20–0.63	0.20–0.25	6.0–7.0	Low to moderate	
100	95–100	95–100	([6])	[7] 0.15–0.19	7.4–8.4	High	High.
100	95–100	95–100	([6])	[7] 0.15–0.18	7.4–8.4	Moderate to high	High.
100	95–100	70–90	0.63–2.00	0.20–0.25	5.1–5.5	Low to moderate	
95–100	90–100	60–90	0.63–2.00	0.16–0.19	5.1–5.5	Moderate	Moderate.
85–95	75–85	30–55	0.63–2.00	0.10–0.14	5.1–5.5	Low	Low.
95–100	95–100	95–100	0.20–0.63	0.18–0.23	5.1–6.5	Low to moderate	
95–100	95–100	95–100	([2])	0.18–0.20	5.1–5.5	Moderate to high	High.
95–100	95–100	95–100	0.63–2.00	0.20–0.25	6.6–7.3	Low to moderate	
95–100	95–100	95–100	0.63–2.00	0.19–0.21	6.6–7.8	Moderate	High.
100	100	95–100	0.06–0.63	0.20–0.25	6.1–7.3	High	High.
100	100	95–100	0.20–0.63	0.20–0.25	6.1–7.3	Moderate	High.
100	100	95–100	0.63–2.00	0.20–0.25	5.6–6.5	Moderate	
100	100	95–100	0.63–2.00	0.19–0.21	5.1–6.5	Moderate to high	Moderate.
100	95–100	95–95	0.20–0.63	0.18–0.21	6.6–7.8	Low to moderate	Moderate.

TABLE 7.—*Estimated*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification: USDA texture	Classification: Unified	Classification: AASHO
	Feet	*Inches*			
Starks (132)	1–3	0–10	Silt loam	ML or CL	A–4 or A–6
		10–34	Silty clay loam to clay loam	CL	A–6 or A–7
		34–68	Stratified loam, silt loam, and sandy loam.	ML, CL, SM or SC	A–4 or A–6
Stoy (164A, 164B)	1–3	0–14	Silt loam	ML or CL	A–4 or A–6
		14–51	Silty clay loam	CL or CH	A–6 or A–7
		51–58	Silt loam	ML or CL	A–6 or A–7
Tamalco (581B, 581B2, 581C2)	3–5	0–9	Silt loam	ML or CL	A–4
		9–28	Silty clay loam to silty clay	CH	A–7
		28–42	Silt loam	CL	A–6
		42–60	Clay loam or loam	CL	A–6
Terril (587B)	3–5	0–48	Loam to silt loam	ML or CL	A–4 or A–6
		48–90	Loam, silt loam, clay loam, or silty clay loam.	ML or CL	A–4 or A–6
Velma (250C, 250C2, 250D, 250D2, 250E, 996C2, 996D2). For properties of the Walshville soils in 996C2 and 996D2, refer to the Walshville series.	5–10	0–18	Loam	ML or CL	A–4 or A–6
		18–70	Clay loam to silty clay loam	CL	A–6 or A–7
		70–100	Sandy loam to loam	ML or CL	A–4
Virden (50)	0–1	0–14	Silty clay loam	CL	A–6 or A–7
		14–53	Silty clay loam	CL or CH	A–7 or A–6
		53–60	Silt loam to silty clay loam	ML or CL	A–6
Walshville	5–10	0–14	Silt loam to loam	ML or CL	A–4
		14–21	Clay loam to silty clay loam	CH	A–7
		21–80	Loam to clay loam	CH or CL	A–6 or A–7
Weir (165)	0–1	0–15	Silt loam	ML or CL	A–4
		15–48	Silty clay loam	CL or CH	A–6 or A–7
		48–60	Silt loam	ML or CL	A–4 or A–6

[1] In this soil at least the uppermost foot of soil material shown in the column "Depth from surface" has been removed by erosion.
[2] Less than 0.20.
[3] More than 5.
[4] Calcareous.

ever, do not represent the entire range of soil characteristics within the county or even within the several soil types sampled. The results of the tests can be used as a general guide, nevertheless, in estimating the properties of the other soils in this county. The tests were performed by the Illinois Division of Highways, Bureau of Materials, Springfield, Ill.

Table 6 gives compaction (*moisture density*) data for the tested soils. If a soil material is compacted at successively higher moisture content, the density of the compacted material increases until the *optimum moisture content* is reached, assuming that the compactive effort remains constant. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed *maximum dry density*. Data that give moisture density are important in earthwork, for as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

Mechanical analysis refers to the measurement of the amounts of various size classes of soil grains (sand, silt, or clay) in a sample. Proportions of the size classes determine the textural class of the material. Names used by engineers for various size classes of particles differ from those used by soil scientists. For example, fine sand in engineering terminology consists of particles 0.42 to 0.074 millimeter in diameter, whereas fine sand, as determined by the soil scientist, consists of particles 0.25 to 0.10 millimeter in diameter.

The tests to determine liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic. As the moisture content is further increased, the material changes from a plastic to a liquid. The *plastic limit* is the moisture content at which the soil material passes from a semisolid to a plastic. The *liquid limit* is the moisture content at which the material passes *properties of soils*—Continued

Percent passing sieve— No. 4 (4.7 mm.)	Percent passing sieve— No. 10 (2.0 mm.)	Percent passing sieve— No. 200 (0.074 mm.)	Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential for metal conduits
			Inches per hour	*Inches per inch of soil depth*	*pH*		
100	95–100	80–95	0.63–2.00	0.20–0.25	5.1–6.5	Low to moderate	
95–100	90–100	60–90	0.20–2.00	0.16–0.19	5.0–5.6	Moderate to high	High.
90–100	80–95	35–80	0.63–2.00	0.15–0.18	6.1–7.3	Low to moderate	Moderate.
100	100	95–100	0.20–0.63	0.20–0.25	5.1–6.0	Low to moderate	
100	100	95–100	0.06–0.20	0.15–0.18	4.5–5.0	Moderate to high	High.
100	95–100	90–100	0.20–0.63	0.18–0.20	4.5–5.0	Low to moderate	High.
100	95–100	95–100	0.20–0.63	0.20–0.25	5.1–6.5	Low to moderate	
100	95–100	95–100	(6)	0.19–0.21	5.6–7.8	High	High.
100	95–100	95–100	(6)	[7] 0.15–0.18	7.9–8.4	Moderate	High.
95–100	70–90	60–80	(6)	[7] 0.14–0.16	7.9–8.4	Moderate	High.
95–100	90–100	85–100	0.63–2.00	0.18–0.20	6.6–7.3	Low	Moderate.
95–100	90–100	85–100	0.63–2.00	0.18–0.20	6.6–7.3	Low	Moderate.
95–100	90–100	50–80	0.63–2.00	0.16–0.20	4.5–6.0	Low to moderate	
95–100	90–100	55–85	0.63–2.00	0.16–0.19	4.5–6.5	Moderate	Moderate.
95–100	90–100	50–90	0.20–2.00	0.10–0.14	5.6–7.8	Low to moderate	Moderate.
100	100	95–100	0.63–2.00	0.19–0.23	6.1–7.3	High	
100	100	95–100	0.20–0.63	0.18–0.20	6.1–7.3	Moderate to high	High.
100	100	95–100	0.63–2.00	0.18–0.23	6.6–7.8	Moderate	High.
95–100	95–100	75–90	0.63–2.00	0.16–0.20	5.1–6.5	Moderate	
90–95	70–90	70–85	0.20–0.63	[7] 0.14–0.16	5.1–6.5	High	High.
80–90	70–85	55–80	(2)	0.14–0.16	7.4–8.4	Moderate to high	High.
100	100	95–100	0.20–0.63	0.20–0.25	5.1–6.0	Low to moderate	
100	100	95–100	0.06–0.20	0.18–0.20	4.5–6.0	Moderate to high	High.
100	95–100	90–100	0.20–0.63	0.18–0.23	5.6–6.5	Low to moderate	High.

[5] Roots generally cannot use moisture at this depth, because the fragipan restricts their development and penetration.
[6] Less than 0.06.
[7] Roots generally do not penetrate to this depth, because of the dense subsoil and high sodium content.
[8] More than 6.30.
[9] In the 138+ mapping unit, about 10 inches of overwash covers the surface.

from a plastic to a liquid. The *plasticity index* is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which soil material is in a plastic condition.

Engineering properties of the soils

For the soils of each soil series in the county, table 7 gives some of the characteristics that are significant to engineering. The estimated properties are those of the typical soil profile, which is divided into layers significant to engineering. Where test data such as those in table 6 were available, those data were used. Where the soils were not tested, the estimates shown are based on comparisons with the soils of this county that were tested and on comparisons with similar soils in other counties.

Depth to bedrock is not estimated in table 7, because bedrock is near the surface in only a few places and generally is not a limitation to engineering work. The places where bedrock is near the surface are mainly north of Nokomis, east of Litchfield, and west of Panama.

In table 7 permeability of the soil as it occurs in place was estimated. The estimates are based on the structure, porosity, and consistency of the soil material and on field observations. The estimates were compared with the results of tests for permeability on undisturbed cores of similar soil material.

Available water capacity, expressed in inches per inch of soil depth, refers to the approximate amount of capillary water in a soil that is wet to field capacity. When the soil is air dry, this same amount of water will wet the soil material to a depth of 1 inch without deeper percolation. The estimates are based on data from undisturbed soil samples or from field measurements of selected soils.

Shrink-swell potential is an indication of the volume change to be expected of the soil material when the content of moisture changes. It is estimated on the basis of the amount and type of clay in the soil. In general, soils

294-384—69——6

TABLE 8.—*Interpretations of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting suitability for engineering practices	
	Topsoil	Sand or gravel	Highway subgrade material	Highway location	Farm ponds: Reservoir area
Blair (5C2, 5C3)	Fair in surface layer of 5C2, and poor in surface layer of 5C3; in 5C3 most of the surface layer has been lost and the remaining material is clayey.	Not suited	Poor to fair	High susceptibility to frost heave; seepage occurs in cuts in many places.	All features favorable.
Camden (134B, 134C2)	Good in surface layer.	Not suited	Poor to fair in subsoil; fair to good in substratum.	Medium to high susceptibility to frost heave; some areas are flooded after heavy rains.	Topography generally not suitable for small ponds; soils underlain by stratified material; possible seepage.
Chauncey (287)	Fair in surface layer.	Not suited	Poor in subsoil; poor to fair in substratum.	High susceptibility to frost heave; in places subject to flooding caused by runoff from adjacent soils; plastic subsoil.	Topography generally not suitable for small pond
Cisne (2, 991). For interpretations for the Huey soil in 991, refer to the Huey series.	Fair in surface layer.	Not suited	Poor in subsoil; poor to fair in substratum.	Seasonal high water table; high susceptibility to frost heave; plastic subsoil.	Poor drainage; suitable for dug ponds; seasonal high water table.
Clarksdale (257)	Good to a depth of 12 inches.	Not suited	Poor	Seasonal high water table; moderate susceptibility to frost heave; plastic subsoil.	Slight limitation for dug ponds.
Colo (402)	Fair to a depth of 24 inches; somewhat clayey; site is often wet.	Not suited	Poor	Subject to flooding; high susceptibility to frost heave; seasonal high water table.	In places underlain by coarse-textured material.
Cowden (112, 993A, 993B2). For interpretations for the Piasa soils in 993A and 993B2, refer to the Piasa series.	Good to a depth of 12 inches.	Not suited	Poor	Seasonal high water table; high susceptibility to frost heave; plastic subsoil in places.	Slight limitation for dug ponds.
Douglas (128B, 128C, 128C2, 128D).	Good to a depth of 12 inches; fair to a depth of 30 inches.	Possible deposits of sand and low-grade gravel below a depth of 4 to 5 feet.	Poor to fair in subsoil; fair to good in substratum.	Moderate susceptibility to frost heave; cuts and fills needed.	In many places underlain by very permeable strata; topography generally not favorable.

engineering properties of soils

Soil features affecting suitability for engineering practices—Continued					Degree of limitations for septic tank disposal field
Farm ponds—Con. Embankments	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	
All features favorable	Natural drainage adequate.	Slow intake rate; many areas are sloping.	No major features that limit construction.	Strong slopes common.	Severe; moderately slow permeability; seasonal high water table; sloping.
All features favorable	Natural drainage adequate.	Moderate intake rate.	If topography is favorable, no major features limit construction.	No major features that limit construction.	Slight.
Fair stability and compaction characteristics; high compressibility.	Soil has gentle slopes but often remains wet after rains; tile drains not usually installed, because of slow permeability of soil material.	Slow permeability; slow intake rate; poor natural drainage.	Practice not applicable.	No major features that limit construction.	Severe; slow permeability; seasonal high water table.
Fair stability and compaction characteristics; high compressibility.	Open ditches needed in many places to remove surface water; tile drains not used, because of slow permeability of soil material.	Slow or very slow permeability; slow intake rate; poor natural drainage.	Practice not applicable.	No major features that limit construction.	Severe; slow or very slow permeability; seasonal high water table.
Unfavorable topography; fair compaction characteristics; good stability; high compressibility.	Drainage needed in many places; tile drains function satisfactorily.	Moderate intake rate.	Practice not applicable.	No major features that limit construction.	Severe; moderately slow permeability; seasonal high water table.
Poor stability and compaction characteristics; poor resistance to piping; high content of organic matter.	Additional drainage needed in most places; tile drains function satisfactorily if an outlet is available; protection from flooding is desirable.	Flooded at times; poor natural drainage; moderate intake rate.	Practice not applicable.	No major features that limit construction.	Severe; subject to flooding; seasonal high water table.
Unfavorable topography; fair compaction characteristics; good stability; high compressibility.	Open ditches needed to remove surface water in many areas; tile drains not used, because of slow permeability of subsoil.	Slow permeability; slow intake rate; poor natural drainage.	Practice not applicable.	No major features that limit construction.	Severe; slow permeability; seasonal high water table.
Subsoil has fair compaction characteristics and stability; substratum more desirable.	Natural drainage adequate.	Moderate intake rate; many areas sloping.	No major features that limit construction.	No major features that limit construction.	Slight for 128B; permeability is adequate, but 128C, 128C2, and 128D have moderate limitations because of slope.

TABLE 8.—*Interpretations of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting suitability for engineering practices	
	Topsoil	Sand or gravel	Highway subgrade material	Highway location	Farm ponds: Reservoir area
Ebbert (48)	Good to a depth of 12 inches; poor below that depth.	Not suited	Poor	High susceptibility to frost heave; seasonal high water table; plastic subsoil.	Slight limitation for dug ponds.
Harrison (127A, 127B, 127B2, 127C, 127C2)	Good to a depth of 12 inches; fair to a depth of 30 inches.	Not suited	Poor	Moderate susceptibility to frost heave.	Moderate limitations for dug ponds; excessive permeability and low water table.
Harvel (252)	Fair	Not suited	Poor	High susceptibility to frost heave; seasonal high water table; flooding in places as the result of runoff from adjacent soils.	Slight limitation for dug ponds.
Hennepin	Poor; in most places contains small stones; surface layer generally thin, and slopes are steep.	Not suited	Fair to good	Slopes are steep; many cuts and fills needed; some seepage in deep cuts.	A few pockets of gravel; otherwise favorable.
Herrick (46, 995). For interpretations for the Piasa soil in 995, refer to the Piasa series.	Good to a depth of 12 inches.	Not suited	Poor	High susceptibility to frost heave; seasonal high water table; plastic subsoil.	Slight limitation for dug ponds.
Hickory (8D, 8D2, 8D3, 8E, 8E2, 8E3, 8F, 8G, 997F, 997G, 998F). For interpretations for the Hennepin soils in 997F and 997G, refer to the Hennepin series; for interpretations for the Negley soil in 998F, refer to the Negley series.	Poor; surface layer generally thin, and some slopes are steep.	Not suited	Subsoil fair; substratum fair to good.	Slopes are steep; many cuts and fills needed; some seepage in deep cuts.	All features favorable, except in the Negley soil of 998F, which has underlying material that is coarse textured and rapidly permeable.
Hosmer (214B, 214C, 214C2, 214C3, 214D2, 214D3).	Good to fair in surface layer; 214C3 and 214D3 are severely eroded and low in content of organic matter.	Not suited	Poor to fair	Moderate susceptibility to frost heave; many cuts and fills needed; slopes are erodible; possible seepage in road cuts.	All features favorable

engineering properties of soils—Continued

Soil features affecting suitability for engineering practices—Continued					Degree of limitations for septic tank disposal field
Farm ponds—Con. Embankments	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	
Topography not well suited; fair to poor stability and compaction characteristics; high compressibility if subsoil is compacted.	Open ditches needed for drainage in most areas; tile systems remove water more slowly than in most soils because of the slow permeability of the subsoil.	Slow permeability; slow intake rate; poor natural drainage.	Practice not applicable.	No major features that limit construction.	Severe; slow permeability; seasonal high water table.
Subsoil has fair to poor stability and compaction characteristics; high compressibility where the soil material is compacted would be more desirable.	Natural drainage adequate in most areas; small, low areas can be improved by tile drainage.	Most areas sloping; moderate intake rate.	No major features that limit construction.	No major features that limit construction.	Slight for 127A, 127B, and 127B2 moderate for 127C and 127C2 because of slope; permeability is adequate.
Topography not well suited; fair to poor stability and compaction characteristics; high compressibility if compacted.	Additional drainage needed in most areas; in many places tile drains are difficult to install because of long distance to an adequate outlet.	Moderate intake rate; poor natural drainage.	Practice not applicable.	No major features that limit construction.	Severe; seasonal high water table; moderately slow to moderate permeability.
All features favorable	Natural drainage adequate.	Steep slopes	Too steep for terraces.	Steep slopes common; cover of plants difficult to establish.	Severe; permeability is adequate, but steep slopes make installation of disposal fields difficult.
Topography not well suited; fair to poor stability and compaction characteristics; high compressibility if compacted.	Additional drainage by tile drains and surface ditches needed in most areas; moderately slow permeability.	Moderate intake rate; moderately slow permeability.	Practice not applicable.	No major features that limit construction.	Severe; moderately slow permeability; seasonal high water table.
All features favorable, except in the Negley soil of 998F, which has underlying material that is coarse textured and rapidly permeable.	Natural drainage adequate.	Steep slopes	Most slopes too steep for terraces.	Steep slopes common; cover of plants difficult to establish.	Permeability is adequate, but steep slopes make installation of disposal fields difficult; 8D, 8D2, and 8D3 have moderate limitations caused by slope; 8E, 8E2, 8E3, 8F, 8G, 997F, 997G, and 998F have severe limitations caused by slope.
Subsoil has fair stability and compaction characteristics; all features favorable in substratum.	Natural drainage adequate.	Shallow rooting depth; slow permeability; slow intake rate; soils are sloping.	Difficult to obtain good growth of crops in terrace channel.	Difficult to obtain a good cover of sod where fragipan is exposed.	Severe; slow permeability in fragipan; installation of disposal fields difficult on the steeper slopes.

TABLE 8.—*Interpretations of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting suitability for engineering practices	
	Topsoil	Sand or gravel	Highway subgrade material	Highway location	Farm ponds — Reservoir area
Hoyleton (3A, 3B, 3B2, 992B). For interpretations for Tamalco soil in 992B, refer to the Tamalco series.	Good to fair in surface layer.	Not suited	Subsoil poor; substratum poor to fair.	High susceptibility to frost heave; seasonal high water table.	All features favorable
Huey	Poor; areas are small and contain slickspots; soil material low in fertility; some of it contains excessive sodium.	Not suited	Poor	Seasonal high water table; high susceptibility to frost heave.	Poor drainage; high water table; suitable for dug ponds; in places water is cloudy because soil particles remain in suspension.
Ipava (43)	Good in surface layer.	Not suited	Poor	High susceptibility to frost heave; unstable when wet; seasonal high water table.	Moderate limitations for dug ponds; slight seepage.
Landes (304)	Good to a depth of 12 inches; somewhat sandy.	Possible source of sand and silt mixtures.	Good to fair	Subject to flooding	Excessive seepage; subject to flooding.
Lawson (451)	Good to a depth of 24 inches.	Not suited	Poor	Subject to flooding; seasonal high water table; moderate susceptibility to frost heave.	Excessive seepage; subject to flooding.
Negley	Fair in surface layer; some slopes are steep.	Good source of mixed sand and gravel below a depth of 8 to 10 feet.	Subsoil fair to poor; very good to good below a depth of 4 feet.	Steep slopes; many cuts and fills needed; some seepage in deep cuts.	Coarse gravel permits excessive seepage.
Nokomis (586)	Good to a depth of 24 inches.	Not suited	Fair to poor	Subject to flooding; seasonal high water table; moderate susceptibility to frost heave.	Excessive seepage
Oconee (113A, 113B, 113B2, 113C, 113C2, 994A, 994B, 994B2, 994C2). For interpretations for the Tamalco soil in 994A, 994B, 994B2, and 994C2, refer to the Tamalco series.	Good in surface layer only.	Not suited	Poor	High susceptibility to frost heave; seasonal high water table; plastic subsoil.	All features favorable

engineering properties of soils—Continued

Soil features affecting suitability for engineering practices—Continued						Degree of limitations for septic tank disposal field
Farm ponds—Con. Embankments	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways		
Subsoil has fair stability and compaction characteristics; all features favorable in substratum.	Additional drainage needed in some areas; tile drains not satisfactory, because of slow permeability of subsoil.	Slow intake rate; slow permeability; in some places soils are gently sloping.	Terrace channel likely to remain wet, and only medium growth of crops is obtained.	No major features that limit construction.		Severe; slow permeability; high water table.
Fair stability and compaction characteristics; high compressibility.	Open ditches needed in many places to remove surface water; tile drains not used, because of very slow permeability of soil material.	Very slow permeability; slow intake rate; poor natural drainage; subsoil highly saturated with sodium.	Practice not applicable.	Difficult to establish grass on alkaline subsoil; in places need to blanket with better soil material or give other special treatment.		Severe; very slow permeability; seasonal high water table.
Fair to poor stability and compaction characteristics.	Additional drainage needed; tile drains function satisfactorily.	Moderate intake rate.	Practice not applicable.	No major features that limit construction.		Moderate; seasonal high water table.
Unfavorable topography; rapid permeability; poor resistance to piping.	Additional drainage needed in some areas; open ditch drainage satisfactory; protection from flooding desirable.	Subject to flooding in places, but has rapid intake rate and permeability; moderate to low water-holding capacity.	Practice not applicable.	No major features that limit construction.		Severe; subject to flooding.
Unfavorable topography; poor stability and compaction characteristics; poor resistance to piping.	Additional drainage needed; tile drains function satisfactorily if an outlet is available; protection from flooding desirable.	Subject to flooding; moderate intake rate.	Practice not applicable.	No major features that limit construction.		Severe; subject to flooding; seasonal high water table.
All features favorable in subsoil; in places substratum is too coarse textured and permeable for an embankment.	Natural drainage adequate.	Steep slopes------	Most slopes too steep for terraces.	Steep slopes common; cover of plants difficult to establish in channel of waterway.		Severe; permeability is adequate, but steep slopes make installation of disposal fields difficult; underlying coarse-textured material allows contamination of nearby water supplies.
Unfavorable topography; poor stability and compaction characteristics; poor resistance to piping.	Additional drainage needed in some areas; tile drains function satisfactorily.	Subject to flooding; moderate intake rate.	Not needed in most places.	No major features that limit construction.		Moderate; seasonal high water table; subject to occasional flooding.
Fair stability and compaction characteristics; high compressibility if compacted.	Additional drainage needed in some areas; tile drains not satisfactory, because of slow permeability of subsoil.	Slow intake rate; slow permeability; most areas are sloping.	Terrace channels likely to remain wet, and only moderate growth of crops is obtained.	No major features that limit construction.		Severe; slow permeability; seasonal high water table.

TABLE 8.—*Interpretations of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting suitability for engineering practices	
	Topsoil	Sand or gravel	Highway subgrade material	Highway location	Farm ponds: Reservoir area
O'Fallon (114B)	Good in surface layer only.	Not suited	Poor to fair	Moderate susceptibility to frost heave.	Slight limitations
Pana (256C2, 256D2)	Good to a depth of 12 inches; somewhat sandy in places.	Possible source of gravel; sand mixtures are below a depth of about 6 feet.	Subsoil good; substratum very good.	Sloping; many cuts and fills needed.	Excessive seepage because of coarse-textured material in the profile and underlying these soils.
Piasa	Poor; areas are small; some areas contain excessive sodium.	Not suited	Poor	Seasonal high water table; high susceptibility to frost heave; plastic subsoil.	Slight limitation for dug ponds; water may be cloudy because soil particles remain in suspension.
Pike (583A, 583B, 583C, 583C2, 583D2).	Good in surface layer.	Possible source of gravel and sand mixtures below a depth of about 5 feet.	Subsoil poor; substratum fair to poor.	Sloping; cuts and fills needed; moderate susceptibility to frost heave.	Excessive seepage in underlying material; coarse textured.
Racoon (109)	Fair to a depth of 24 inches.	Not suited	Poor	Moderate susceptibility to frost heave; seasonal high water table; susceptible to flooding after heavy rains.	Slight limitation for dug ponds; subject to flooding.
Radford (74)	Good to a depth of 12 inches.	Not suited	Poor	Subject to flooding; high susceptibility to frost heave; seasonal high water table.	In places underlain by coarse-textured material; subject to flooding.
Shiloh (138, 138+)	138 is fair to poor; 138+ is good to a depth of 10 to 12 inches.	Not suited	Poor	High susceptibility to frost heave; seasonal high water table; in places subject to flooding caused by runoff from adjacent higher soils.	Slight limitations for dug ponds.
Sicily (258B, 258C2)	Good in surface layer.	Not suited	Poor	Moderate susceptibility to frost heave.	All features favorable

engineering properties of soils—Continued

Soil features affecting suitability for engineering practices—Continued					Degree of limitations for septic tank disposal field
Farm ponds—Con. Embankments	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	
Subsoil has fair stability and compaction characteristics; all features favorable in substratum.	Natural drainage adequate.	Moderate rooting depth; slow permeability; slow intake rate.	Difficult to obtain good growth of crops in terrace channel.	Cover of plants difficult to establish because of the fragipan.	Severe; fragipan slowly permeable.
Subsoil has no unfavorable characteristics; substratum is rapidly permeable and subject to seepage.	Natural drainage adequate.	Strong slopes	No major features that limit construction.	No major features that limit construction.	Moderate, because slopes are somewhat steep for installing disposal fields; fast movement of water in coarse-textured material can contaminate the water supply.
Unfavorable topography; fair compaction characteristics; good stability; high compressibility.	Open ditches needed to remove surface water in many areas; tile drains not used, because of very slow permeability of subsoil.	Very slow permeability; slow intake rate; poor natural drainage; subsoil saturated with sodium.	Practice not applicable.	Difficult to establish grass on alkaline subsoil; in places need to blanket with better soil material or give other special treatment.	Severe; very slow permeability; seasonal high water table.
Subsoil has fair stability and compaction characteristics; all features favorable in substratum.	Natural drainage adequate.	Strong slopes in most places; slow water intake rate.	No major features that limit construction.	No major features that limit construction.	Permeability is adequate; slope is a slightly limiting factor in 583A and 583B, and a moderately limiting factor in 583C, 583C2, and 583D2.
Poor stability and compaction characteristics; poor resistance to piping in uppermost 2 feet.	Additional drainage needed in most places; open ditches used because of the slow permeability of the subsoil.	Slow intake rate; poor natural drainage; slow permeability; in places subject to occasional flooding.	Practice not applicable.	No major features that limit construction.	Severe; slow permeability; subject to occasional flooding; seasonal high water table.
Poor stability and compaction characteristics; poor resistance to piping.	Additional drainage generally needed; tile drains function satisfactorily; protection from flooding is desirable.	Subject to flooding; moderate intake rate.	Practice not applicable.	No major features that limit construction.	Severe; subject to flooding; seasonal high water table.
Fair stability and poor compaction characteristics; high compressibility if compacted.	Additional drainage needed; tile drains function satisfactorily if an adequate outlet is available; in places receives runoff from higher lying soils.	Moderately slow to slow permeability; in places receives runoff from adjacent higher lying soils.	Practice not applicable.	No major features that limit construction.	Severe; moderately slow to slow permeability; seasonal high water table.
Subsoil has fair stability and compaction characteristics; all features favorable in substratum.	Natural drainage adequate.	Moderate slopes; moderate intake rate.	No major features that limit construction.	No major features that limit construction.	Permeability is adequate; limitations caused by slope are slight in 258B and moderate in 258C2.

TABLE 8.—*Interpretations of*

Soil series and map symbols	Suitability as a source of—			Soil features affecting suitability for engineering practices	
	Topsoil	Sand or gravel	Highway subgrade material	Highway location	Farm ponds: Resevoir area
Starks (132)	Good in surface layer.	Not suited	Poor above a depth of 4 feet; fair below that depth.	Moderate susceptibility to frost heave; seasonal high water table; in places subject to flooding after heavy rains.	Topography generally not sutable for small ponds.
Stoy (164A, 164B)	Fair in surface layer.	Not suited	Poor to fair	High susceptibility to frost heave; seasonal high water table.	All features favorable
Tamalco (581B, 581B2, 581C2).	Poor; surface layer is thin and in places soil material contains excessive sodium.	Not suited	Poor	High susceptibility to frost heave; difficult to grow cover of plants on the sides of cuts.	Water may be cloudy because soil particles remain in suspension.
Terril (587B)	Good to a depth of 24 inches; fair below that depth.	Not suited	Poor to fair	Medium to high susceptibility to frost heave; subject to flooding during times of extremely high water.	In most places topography is not suitable for small ponds.
Velma (250C, 250C2, 250D, 250D2, 250E, 996C2, 996D2). For interpretations for Walshville soils in 996C2 and 996D2, refer to the Walshville series.	Fair in surface layer.	Not suited	Subsoil fair; substratum fair to good.	Sloping; many cuts and fills necessary; in many places seepage causes difficulty in cuts.	Thin layers of gravelly material allow seepage.
Virden (50)	Fair in surface layer; seasonally wet; somewhat clayey.	Not suited	Poor	High susceptibility to frost heave; seasonal high water table; plastic subsoil in places.	Moderate limitations for dug ponds.
Walshville	Poor; occurs in small areas; has thin surface layer; in places soil material contains excessive sodium.	Not suited	Poor	Moderate susceptibility to frost heave; plastic subsoil; many cuts and fills needed; seepage causes difficulty in cuts; difficult to grow grass on the sides of cuts.	Water may be cloudy because of soil particles that remain in suspension.
Weir (165)	Fair in surface layer; poorly drained sites.	Not suited	Poor	High susceptibility to frost heave; seasonal high water table; plastic subsoil.	Slight limitations for dug ponds.

engineering properties of soils—Continued

Soil features affecting suitability for engineering pյactices—Continued					Degree of limitations for septic tank disposal field
Farm ponds—Con.: Embankments	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	
Fair stability and compaction characteristics; material in substratum subject to piping.	Additional drainage needed in some areas; surface ditches usually used.	Slow intake rate	No major limiting factors, but terraces and diversions generally not needed.	No major features that limit construction.	Moderate; moderate to moderately slow permeability; seasonal high water table.
Subsoil has fair stability and compaction characteristics; all features favorable in substratum.	Additional drainage needed in some areas; tile drains not satisfactory, because of slow permeability of subsoil.	Slow intake rate and slow permeability; some areas are gently sloping.	Terrace channel tends to remain wet, and only moderate growth of crops is obtained.	No major features that limit construction.	Severe; slow permeability; seasonal high water table.
Subsoil has fair stability and compaction characteristics; high compressibility if compacted; all features favorable in substratum.	Natural drainage adequate.	Slow intake rate; very slow permeability; subsoil saturated with sodium.	Difficult to obtain good growth of crops in channel because subsoil has unfavorable characteristics.	Difficult to establish grass on alkaline subsoil; need to blanket area with better soil material in places or to give other special treatment.	Severe; very slow permeability.
All features favorable	Natural drainage adequate.	Moderate intake rate; gently sloping.	No major features that limit construction.	No major limiting factors.	Slight.
Fair stability and compaction characteristics; high compressibility if compacted.	Natural drainage adequate.	Strong slopes	No major features that limit construction.	No major features that limit construction except that some slopes are steep.	Permeability is adequate; limitations caused by slope are moderate in 250C, 250C2, 250D, 250D2, 996C2, and 996D2; they are severe in 250E.
Unfavorable topography; fair stability and compaction characteristics; high compressibility if compacted.	Additional drainage needed; tile drains supply adequate drainage.	Moderately slow permeability; poor natural drainage.	Practice not applicable.	No major features that limit construction.	Severe; moderately slow permeability; seasonal high water table.
Fair stability and compaction characteristics; high compressibility if compacted.	Natural drainage adequate.	Strong slopes; slow intake rate; slow permeability; subsoil saturated with sodium.	Difficult to obtain good growth of crops in channel because subsoil has unfavorable characteristics.	Difficult to establish grass on alkaline subsoil; need to blanket area with better soil material in places or to give other special treatment.	Severe; slow permeability; slopes are somewhat steep for installing disposal fields.
Unfavorable topography; fair stability and compaction characteristics; high compressibility if compacted.	Additional surface drainage needed in some areas; open ditches installed in most places, as tile will not function because of slow permeability of subsoil.	Slow intake rate; slow permeability; poor natural drainage.	Practice not applicable.	No major features that limit construction.	Severe; slow permeability; high water table.

classified as A–7 and CH have high shrink-swell potential. Clean sands and gravel, which are structureless (single grain), and sands and gravel that contain a small amount of nonplastic to slightly plastic fines, have low shrink-swell potential, as does most other nonplastic to slightly plastic soil material.

Some soils tend to cause corrosion of untreated steel underground conduits and pipes. The corrosion potential is influenced by the soil texture, by the amount and type of clay in the soil, by the acidity of the soil, by the amount and kind of soluble salts present, by the content of moisture, and by the kind of material from which the conduit is made. Table 7 gives estimated ratings of *high*, *moderate*, and *low* for the soil horizons in which conduits are likely to be buried. Because a conduit would normally not be buried in the surface layer, ratings are not given for that layer.

Engineering interpretations of the soils

Table 8 indicates suitability of the soils as a source of topsoil, sand or gravel, and subgrade material for highways. It also names specific features of the soils that can affect the selection, design, and construction of various engineering works. These features are evaluated from test data and from field experience. A particular feature of a soil can be helpful in one kind of engineering work but a hindrance in another. A highly permeable substratum, for example, is undesirable as a site for a pond, but it could be advantageous where artificial drainage is needed.

Highways and other structures can be severely damaged by the shrinking and swelling of the underlying soils. Susceptibility to frost heave is an important factor in rating suitability for the location of a highway. A high water table and susceptibility to flooding are other important factors in choosing a suitable location.

Table 8 also shows soil features that affect the installation of structures used for managing water. In Montgomery County the most suitable structures for managing water are farm ponds, diversions, grassed waterways, systems that provide artificial drainage, and structures that help to control erosion.

The site for a pond must be selected with care. Table 8 names soils that are not suitable or that are of doubtful quality for a pond. Slowly permeable soils are the most suitable for a reservoir area, and they generally can be used in the embankment. The appraisals of suitability of the soils for embankments are based on the permeability, supporting strength, and ease of compaction of the soil material and on the stability of this material in slopes.

Soils that have a high content of silt make suitable material for embankments only when special effort is made to obtain a high degree of compaction. Unless these silty soils are well compacted, embankments made of them are likely to be porous, and they allow water to seep through them in a relatively short time. As a result, the soil material on the downstream side of the embankment becomes wet and can slide out of place. Piping is another major hazard in many silty and sandy soils. Where the rate of seepage through the embankment is rapid, the finer particles of soil material are washed out and holes that resemble tunnels are left. These holes can eventually destroy the embankment.

Artificial drainage is needed in many of the nearly level soils. Drainage is accomplished by installing tile drains or shallow surface ditches and by providing deep outlet ditches. The drainage system should be planned by an engineer experienced in that kind of work.

Tile drains are not effective in all soils that need supplemental drainage. They are not satisfactory, for example, in soils that contain a claypan through which water moves very slowly. Where tile drains are installed, an adequate outlet is essential. Sites for an outlet are not available in some areas of bottom lands along streams.

Shallow surface ditches are well suited to use for draining the level or nearly level soils that contain a claypan. These drains consist of a wide, shallow channel that can be crossed easily by farm machinery. They can be used in combination with tile drains or as a separate drainage system. In many locations the efficiency of a surface drainage system can be improved by land smoothing. Land smoothing consists of removing small ridges and high spots, and of filling shallow low areas. This leaves a more nearly uniform field slope and lets water move quickly into the drainage channel.

Deep outlet ditches generally receive water flowing from tile, surface drainage channels, and other outlet ditches. Generally, it is necessary to construct the ditch across two or more adjacent farms so that an adequate outlet can be reached. The rapid growth of woody vegetation in outlet ditches necessitates regular maintenance to keep the ditches operating effectively. In planning and constructing an outlet ditch, it is necessary to determine the capacities of bridges and culverts and the need for structures to lower the surface flow into the outlet ditch without causing erosion. Caving of the banks can be caused by underlying layers of sand.

Table 8 names soil features that affect suitability for irrigation. Among the features that affect suitability are intake rate, soil permeability, slope, natural drainage, and susceptibility to flooding. Also important is the presence of sodium salts in the subsoil.

Terraces and diversions help to control erosion in sloping soils. In many parts of the county, terraces are not practical, however, because the slopes are steep or irregular. Diversions generally can be used if a stabilized outlet is available.

Grassed waterways serve as an outlet for diversions or terraces. They also help to prevent gullying in natural watercourses. The channels have to be properly shaped and should have a dense cover of sod. Ordinarily, establishing vegetation in a waterway is difficult if the soils are shallow or steep. A good mulch, liberal applications of fertilizer, and normal tillage are helpful.

Ratings of *slight*, *moderate*, and *severe* are given in table 8 to show the degree of limitation for septic tank disposal fields. Among the features that make a site unfavorable for the construction of a disposal field for effluent from a septic tank are moderately slow or slower permeability, flooding, a seasonal high water table, and steep slopes. Some soils that are formed in or are underlain by coarse-textured, rapidly permeable material absorb effluent from septic tank disposal fields so rapidly that the effluent reaches underground water supplies before it is completely filtered. Where this hazard of contamination is a possibility, it is noted in table 8.

Genesis, Classification, and Morphology of Soils

This section has four main parts. The first gives facts about the formation, or genesis, of soils, the second describes process of soil development, and the third gives facts about the genesis of selected horizons. The fourth briefly discusses the classification of soils under the system currently used by the National Cooperative Soil Survey and classifies the soils according to that system and the system earlier used by soil scientists.

Factors of Soil Formation

Soil is formed by weathering and other processes that act on parent material. The characteristics of the soil at any given point depend upon the parent material, plant and animal life, climate, time, and topography and drainage. Four of these factors have been important in causing differences among the soils in Montgomery County. The fifth, climate, apparently has not caused major differences in the soils, because the climate is practically uniform throughout the county. The climate of Montgomery County is discussed in the section "Additional Facts About the County."

Parent material

The soils of Montgomery County have formed in three main kinds of parent material, namely loess, glacial drift, and silty and loamy alluvium. None of the soils have formed in parent material derived from the underlying bedrock. In the following paragraphs, these main kinds of parent material and the bedrock are described and the types of clay minerals in the soils are briefly discussed.

Loess.—Loess is the most important kind of parent material from which the soils in the county were derived and is the material from which the soils of many of the series have formed. It was deposited by wind during the Wisconsin glacial age. Loess consists mostly of silt-sized particles, but it contains some clay. It was blown mainly from the valleys of the Illinois and Mississippi Rivers and was deposited in the areas where it now lies. The deposit of loess is thickest in the northwestern part of the county, where it is about 7 feet thick. It is thinnest on the upland plain in the southeastern part of the county, where it is only about 4 feet thick.

When the loess was deposited, it was calcareous, was nearly uniform in characteristics, and consisted of relatively unweathered particles of rock. Since that time, the processes of soil development have acted to change it to soils that are decidely different.

Glacial drift.—This is the second most important of the parent materials in the county. It lies beneath the loess and is of Illinoian age. The drift consists of Jacksonville till in the northern part of the county, Mendon (Payson) till in the western part, and a belt of ridge drift in the eastern part that marked the contact of the Saginaw lobe with the Lake Michigan lobe (*28*). According to Leighton and Brophy (*17*), the moulin kames, crevasse ridges, and subcrevasse channels on and in the land surface in this area indicate wastage of the glacier by stagnation. The thickness of the drift ranges from more than 100 feet, over valleys of buried bedrock or in morainal areas, to only a thin covering over bedrock highs, such as those north of Nokomis in the general area where limestone is quarried. The layer of drift is also thin in areas where modern streams are cutting into the bedrock, as in the areas east of Litchfield and west of Panama.

Where the glacial drift consists of a mixture of many kinds of unsorted rocks of various sizes (pebbles, sands, silts, and clays), which were deposited by ice, it is known as glacial till. Glacial till is the parent material of the Blair, Hennepin, Hickory, Velma, and Walshville soils. Unweathered, unleached till lies below the profiles of soils that developed in the till. In most places the texture of the till is loam, but it is sandy loam in places. The till contains some calcium and magnesium carbonates but does not contain large amounts.

Stratified drift deposited by glacial melt water contains much more sand and gravel than the glacial till, and it is called glacial outwash or coarse-textured drift. The Pana and Negley soils have developed in this coarser textured material. The unweathered, unleached outwash beneath the Pana and Negley profiles consists mainly of sand and rounded pebbles that are mostly less than 2 inches in diameter. In some places this material is finer textured, however, and consists of sand and loamy sand. The coarse-textured drift is used locally for roads but is too sandy to be well suited to that use.

Bedrock.—Below the drift is bedrock of Pennsylvanian age. The elevation at which the bedrock occurs ranges from about 650 feet above sea level, in a few spots in the northern part of the county, to about 400 feet along the southern border of the county, near Donnellson. The point where the elevation is only 400 feet is in the buried valley of the ancestral Shoal Creek (*9*).

Montgomery County is in the southwestern part of the Pennsylvanian basin in which thick sedimentary rocks occur. These rocks are primarily shales, sandstones, limestones, and coals that were deposited in a cyclical pattern. Both the upper and middle groups of Pennsylvanian formations occur extensively in this county (*16*). The middle group is especially important because in that group are most of the mapped minable coal reserves in Illinois. Rocks of Pennsylvanian age are near the surface or at the surface in some places, though they have not supplied the parent material for any of the soils.

Alluvium.—Silty and loamy alluvium is the parent material of the soils in the valleys of the major streams. Most of this material has a texture of silt loam or loam, but the texture is silty clay loam in a few places. The alluvium has been deposited over a long period of time that possibly extended from the end of the period when loess was laid down to the present time.

Clay minerals.—The type of clay minerals in the soil material is related to the kind of parent material. Studies made by Frye, Glass, and Willman (*7*) indicate that the principal clay minerals in the soils of this county that developed in loess are montmorillonite and vermiculite, but that illite is the principal clay mineral in the soils that developed in glacial till. Because alluvium is derived both from loess and glacial till, we can expect that the clay minerals in soils that developed in this material consist of a mixture of montmorillonite and illite.

Plant and animal life

Plants and animals have contributed much to the development of soils in Montgomery County. Plants, through their growth and partial decomposition, are responsible for the organic matter in soils. Animals are responsible for burrowing in the soil material and mixing it.

Many differences in the soils of this county have been caused by differences in the kind of vegetation that has grown in various areas since the soil material was deposited. The thickness and dark color of the surface layer of Mollisols, for example, was caused by black organic matter, which, in turn, resulted from the decomposition of herbaceous plants that grew in the prairie areas of the county. These soils have a high content of organic matter and organic carbon (fig. 13), and as a result, they are high in nitrogen-supplying capacity.

The soils that have developed under forest, for example the Hosmer, Hickory, and Pike, have a thin, dark-colored surface layer that has resulted from the mixing of dead leaves with the mineral surface soil. The plow layer of those soils is comparatively light colored (fig. 14). It contains less organic matter than the surface layer of the dark-colored soils.

A land survey prepared in 1818, before white persons settled in the area, shows the distribution of tracts under grass and of tracts under forest in that year. It shows that trees were growing on some of the dark-colored soils at that time, indicating that forests were invading the areas of prairie. The survey also shows that grass covered some areas of moderately dark colored soils, indicating that the forest cover had receded in some areas.

Animals have influenced the development of soils. The Harvel soils, for example, appear to consist principally of crayfish burrows that have been filled with mixed soil material. Because of this mixing, the Harvel soils have a subsoil that is less uniform in characteristics than the subsoils of the Virden and Shiloh soils, which have not been mixed extensively by burrowing crayfish.

The Pana soils appear to have developed in mixed loess and gravelly glacial drift. This is apparently true because it is doubtful if soils that contain as many fine particles as the Pana soils could have developed entirely from coarse-textured material, such as drift. It is also difficult to understand how erosion could have removed all of the loess cap in areas of Pana soils, because those soils generally occur on the summit of morainal ridges. It appears much more probable that the Pana soils have developed in loess and gravelly drift mixed by groundhogs or other burrowing animals.

Earthworms continually mix the soil material, and their burrows terminate several feet below the surface in a spherical void. Many of these burrows are lined with dark-colored clay, which indicates that they are features of the soil that have been used over a long period of time.

Bacteria and fungi have also contributed much to the development of organic matter in soils. It is believed that bacteria were the more important organisms that contributed to the decomposition of herbaceous material in the prairie areas, and that fungi were more important in causing the decomposition of leaves, tree roots, and wood.

Topography and soil drainage

All of Montgomery County is in the Springfield Plain of the Central Lowland Province (*18*). The county consists mainly of a nearly level plain in which streams have cut steep-walled valleys. A large area of ridged drift, consisting of rolling moraines and kames, however, extends from the northeastern corner of the county southwestward towards Hillsboro and south to a point beyond the county line. These rolling moraines and kames are interspersed with small areas of plains, some of which are basins of old lakes. One of these former lake basins lies north of Butler. Its center is in the northwestern part of section 10, T. 9 N., R. 4 W.

Most of the rolling morainal areas in the eastern part of the county are 650 to 760 feet above sea level, but the elevation at Bald Knob is 764 feet. The elevation of most of the gently sloping areas of uplands is 600 to 625 feet, but that in the stream valleys is somewhat lower. The lowest elevation, approximately 503 feet above sea level, is at a point where Shoal Creek leaves the south side of the county, near Panama. Elevations at other points in the county are Hillsboro, 630 feet; Nokomis, 670 feet, and Farmersville, 643 feet.

Topography influences soil drainage, and soil drainage, in turn, greatly affects the color of the soils. Soils that have developed under good drainage have a subsoil that is uniformly brown in color, but Virden, Piasa, and similar soils that have developed under poor drainage have a grayish color. Soils that have developed where the drainage is intermediate between good and poor have a subsoil that is mottled with gray and brown. The grayish colors persist.

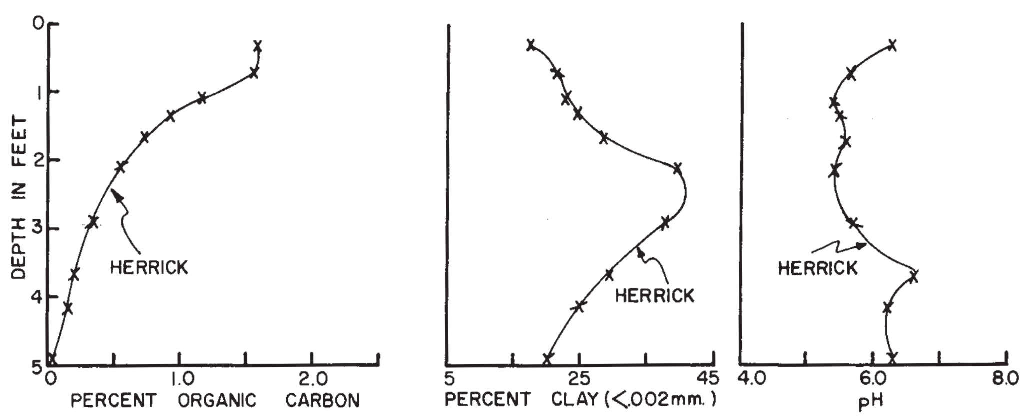

***Figure 13.*—Some properties of a selected dark-colored soil.**

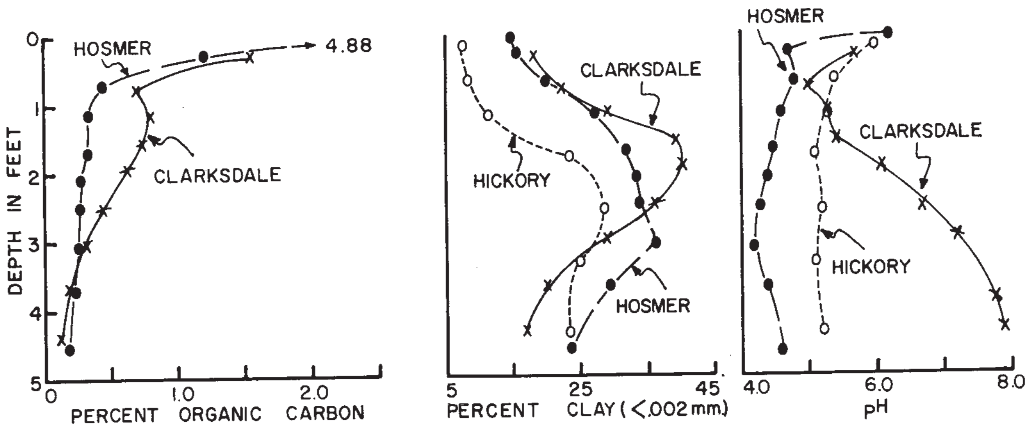

Figure 14.—**Some properties of selected light-colored soils.**

even though the drainage is greatly improved by ditches and tile drains.

Good drainage, or the lack of it, is also related to the eluviation of clay from the A to the B horizons. In the sloping Douglas soils, and in others of the steeper, well-drained soils, the rate at which clay moves downward in the profile is only moderate. In nearly level soils, such as the Herrick, on the other hand, more clay has accumulated than in the Douglas soils, and these soils generally have a more distinct profile than the Douglas soils.

The profiles of Virden and other soils that have poor natural drainage show that only a small amount of clay has moved downward in those soils. This is probably because no appreciable amount of water has moved through the profile to carry the fine particles of clay downward. Lack of water movement also explains the differences in reaction between the Virden and Herrick soils. The reaction of the Virden soils is about neutral throughout the profile, but the surface layer and the subsoil of the Herrick soils are acid.

Time

Time is needed for the processes of soil development to exert their influence on the soil profile. Soil age is different from geologic age in that soil age refers to the period during which the soil material has been weathered, rather than to the date the material was deposited. As an example, the Hennepin soils are considered to be young because their parent material was recently uncovered by valley entrenchment and by the widening of stream valleys by streambank cutting. The oldest soils in the county are those formed in loess, which was deposited during the Wisconsin age, from 10,000 to 60,000 years ago (7). Because loess formerly completely covered the county, all the other soils must have developed in material that was uncovered after the loess was deposited and was eroded away, and those soils are of more recent age than the ones that developed in loess.

Some soils that developed in glacial till are of Late Wisconsin age, but others have developed only recently. Hickory soils are typical of the older soils that formed in glacial till. Their profile is as well developed and as leached as that of the loess-derived Pike soils, and they have accumulations of clay in their B horizons that are similar to those in the Pike soils. Hennepin soils are the most recent soils that developed in glacial till. Except that those soils have a thin, dark-colored surface layer that is generally leached of carbonates, those soils lack a well-developed profile.

The soils that developed in alluvial deposits are of about the same age as those that developed in glacial till. The Camden and Starks soils, for example, are old enough that they have as distinct B horizons as those in the Hickory soils. Lawson soils, on the other hand, are so recent that they do not contain distinct horizons, except for upper horizons that have resulted from some accumulation of organic matter. In this respect their age is comparable to that of the Hennepin soils. The ages of the Nokomis and Terril soils are intermediate between those of the Camden and Starks soils, which have well-developed profiles, and those of the Lawson soils, which have only a slightly developed profile.

Processes of Soil Development

After the parent material of the soils of Montgomery County was deposited or was uncovered, it was changed by the processes of soil development until it became a distinct kind of soil, or several distinct kinds of soil. These processes are the accumulation of organic matter; disintegration of rock; weathering of rock minerals to soluble materials; leaching of the soluble materials; movement of clay from the upper horizons to the lower, and accumulation of clay in the lower horizons; and movement, oxidation, reduction, and hydration of iron. Most of these processes required a long period of time to become apparent.

The accumulation of organic matter is one of the first changes that can be noticed in a soil. It is influenced by the kind of drainage and the type of vegetation. In soils that formed in alluvium, for example the Lawson soils, accumulation of organic matter is the most obvious characteristic that distinguishes the upper horizons from the lower.

Disintegration of rock, especially in some of the granites or other igneous rocks in the glacial till parent material of the Hickory and Velma soils, is a process that begins early in the development of a soil. This process is not important, however, in the development of soils formed in loess and in alluvium.

Weathering of some resistant rocks results in changes in which soluble compounds are released. These soluble compounds then become plant nutrients that are held available to plants. When feldspars are weathered, for example, they slowly release potassium, sodium, calcium, magnesium, and other elements in soluble form, and these elements then become available to plants. Also, apatite slowly releases soluble phosphorus, and this phosphorus accumulates in the soil. The release of plant nutrients is generally too slow to supply the large amounts of plant nutrients needed for present-day farming, though it is important in the development of soils.

Leaching of soluble material takes place in soils, but this process is slow in the Piasa and other alkaline soils. Early in the development of soils, limestone pebbles and rocks are decomposed and some of their weathering products are leached away. Water slowly removes the calcium, potassium, magnesium, and other carbonates from the soils. This has happened in the Hickory soils, where leaching since the Wisconsin ice age has removed the carbonates to a depth of 4 to 6 feet. This leaching eventually causes a soil to be acid and less productive than other soils that have been less extensively leached. Examples of strongly leached soils are the Hosmer, Stoy, and Weir.

Percolating water slowly washes the clay in the upper horizons of a soil downward through the soil pores and deposits it in the subsoil. In Montgomery County this process is most evident in the Cowden, Cisne, and Weir soils. In many places the subsoil of these soils is three times as rich in clay as the surface horizons, as indicated by the content of clay in the profile of the Cowden soils (fig. 15). This process is less evident in the profile of the Herrick soils (see fig. 13) than in the profile of the Cowden soils, and it is also less evident in the profile of the Shiloh soils, which have considerable clay in the surface layer and only a slightly larger amount in the upper part of the subsoil. This movement of clay has not occurred in the Hennepin and Lawson soils to any noticeable extent.

Iron and organic matter are primarily responsible for the colors of a soil. Organic matter gives the soils a dark color, and iron makes them reddish brown or yellow. If the iron is not uniformly distributed, and if the soil particles are not coated with iron, the soil particles retain their natural color, which is gray. Formed where drainage is good is a ferric oxide, which is red. As a result, reddish or brownish soils, for example the Pana, Negley, Pike, and Hickory, occur in areas where the iron is oxidized. Where drainage is somewhat poor or is only moderately good, the ferric iron is hydrated and the soils have a more yellowish color.

The Virden, Cowden, and other poorly drained soils have a grayish color because the iron in those soils is poorly oxidized and is in the ferrous form. Ferrous oxide is only slightly soluble and tends to concentrate in some places where it can be oxidized as the result of a fluctuating water table. This oxidation produces the mottled pattern of gray and brown colors characteristic of poorly drained soils. In many poorly drained and somewhat drained soils, the iron is segregated in small, hard nodules or concretions, commonly called buckshot.

Genesis of Selected Horizons

Because of their extent in Montgomery County, and because of their effect on soil management, the soils that contain a fragipan and those that contain natric horizons (horizons high in content of exchangeable sodium) are of special interest. Results of recent research, discussed in the following paragraphs, have helped to increase our understanding of these horizons. Profiles of soils containing these horizons, as well as profiles of the other soils mapped in this county, are described in detail in the section "Descriptions of the Soils."

Fragipan horizons

A fragipan horizon consists of a layer that is dense or brittle when dry and appears to owe its hardness to extreme density or compactness rather than to the content of much clay or to cementation. This horizon is often considered to be massive but consists of rather large, poorly formed, massive blocks that are bounded by streaks or cracks filled with gray, silty material. A fragipan horizon is slowly permeable to water and restricts the growth of roots. Though it appears to be cemented when dry, it loses its hard, brittle consistency when it is moistened. When the fragipan is thoroughly wet, it slakes down to a nonsticky or only slightly sticky mass. Whether the hardness and brittleness are caused by cementation by some chemical agent or merely by dehydration of small amounts of clay between closely packed silt grains is not known.

Moderately well drained Hosmer and O'Fallon soils have a fragipan of varying degrees of development in the lower part of their profile, and to a lesser extent, the Stoy soils also contain a fragipan. In this county these horizons are less strongly developed than those in soils farther south in Illinois, but they definitely restrict the movement of water and the development of roots.

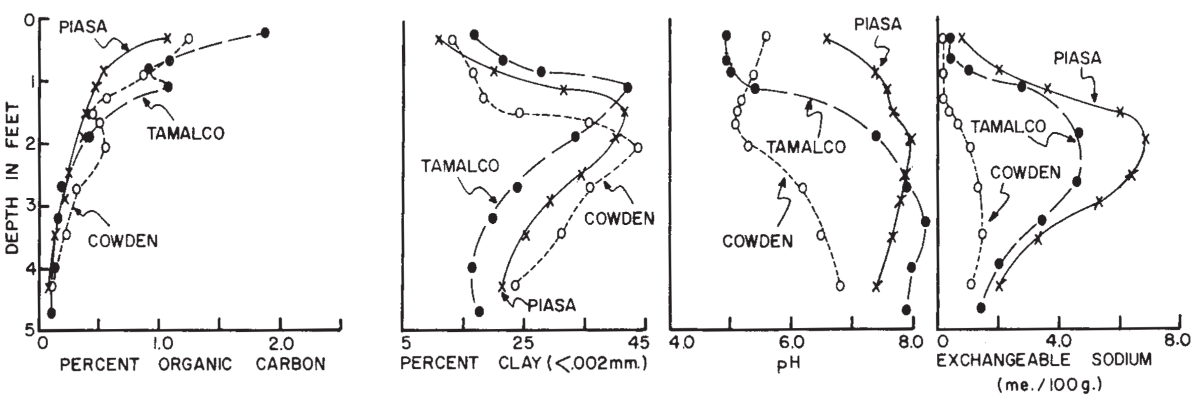

***Figure 15.*—Some properties of selected soils that have a claypan in the subsoil.**

Recent studies of Illinois soils that contain a fragipan (*8*) give general characteristics, relationships in the field, mineralogy, and micromorphology of the Hosmer silt loams. The genesis of the fragipan in those soils is believed to be related to their silty texture, to the stage of weathering, and to the depth to a temporary or perched water table.

Natric horizons

Among the most difficult soils to manage in Montgomery County are the soils that contain natric horizons, that is, soils that have a subsoil that is high in content of exchangeable sodium. These are often called slickspots. They occupy areas of irregular shape that range from only a few square feet to more than 100 acres in size. The soils that contain natric horizons are the Walshville loams, developed primarily in Illinoian glacial till, and the Tamalco, Huey, and Piasa silt loams, developed primarily in loess.

Walshville soils occur in the valleys cut into the glacial till plain by streambed erosion. In these soils the lateral movement of water from the adjacent higher areas is thought to have caused sodium to concentrate in the subsoil. In some places the Tamalco soils have developed under similar topographic conditions in slightly entrenched valleys that have a cover of loess. In many places, however, the Tamalco soils are on convex ridges above the general till plain. In this type of topography, lateral seepage is less likely to have contributed to the content of sodium in these soils.

The Huey and Piasa soils are at the base of slopes or near the edges of drainageways in some places. In most places, however, nearly level areas of those soils are intermingled with areas of acid Herrick, Cowden, and Cisne silt loams. The mechanism that causes the exchangeable sodium to concentrate is more complicated in nearly level areas and on ridgetops than in other places.

The sequence of horizons in soils that contain natric horizons is similar to that of the soils with which they occur, but the surface layer is lighter colored, the subsurface (A2) horizon is thinner, and the subsoil is shallower than in associated soils. Also, carbonate concretions are scattered throughout the B horizons (*5*). Soils that contain natric horizons have higher pH values, that is, are alkaline, and contain much more exchangeable sodium than the soils with which they occur (see fig. 15). For example, the Huey, Piasa, Tamalco, and other soils that contain natric B horizons have pH values higher than 7.5 and contain 3 to 7 milliequivalents of exchangeable sodium (Na) per 100 grams of soil. In contrast, the Cisne, Cowden, and Herrick soils with which those soils occur generally have pH values of less than 6.5 and a content of exchangeable sodium of less than 1 milliequivalent per 100 grams of soil.

In the B horizons of soils that contain natric horizons, the content of exchangeable sodium ranges from about 10 to 30 percent of the cation-exchange capacity. Below the B horizons of solonetzic soils, the content of exchangeable sodium decreases with increasing depth. The underlying Illinoian till and the Pennsylvanian bedrock contain little exchangeable sodium, which suggests that these two underlying materials are not the primary source of sodium in loess-derived soils of Illinois that contain natric horizons (*5*).

Detailed chemical and mineralogical analyses of these loessal soils that contain natric horizons indicate that the exchangeable sodium in those soils originated chiefly from weathering in place of sodium-rich feldspars (which also contain potassium) of the parent loess (*27*). Because the loess in which these soils formed appears to have the same characteristics as that in which the associated soils formed, and these soils have been subjected to the same degree of weathering as the associated soils, it is suggested that differential redistribution of the soluble products of weathering is responsible for the accumulations of exchangeable sodium (Na) in soils that contain natric horizons, such as the Huey, Piasa, and Tamalco. Studies made by Frazee and others (*6*) show that though the soils that contain natric horizons are only one-seventeenth as permeable as the soils with which they occur, the paleosols in the Illinoian till beneath the natric horizons are five times as permeable as those underlying the associated soils.

Initially, the calcium, magnesium, sodium, and other soluble salts produced by weathering, originating both within and without the current areas of soils that contain natric horizons, would have concentrated in the lower part of the loess, which is underlain by more permeable till (*27*) (fig. 16, initial stage), Drying of these salt solutions late in summer, and decreasing pressures of carbon dioxide in the subsoil, has caused the solubility limits of the calcium and magnesium carbonates to be exceeded. As a result, these carbonates were precipitated out and formed concretions, and the relative proportions of sodium in solution increased by a corresponding amount. As the B horizons became dispersed by receiving continued accumu-

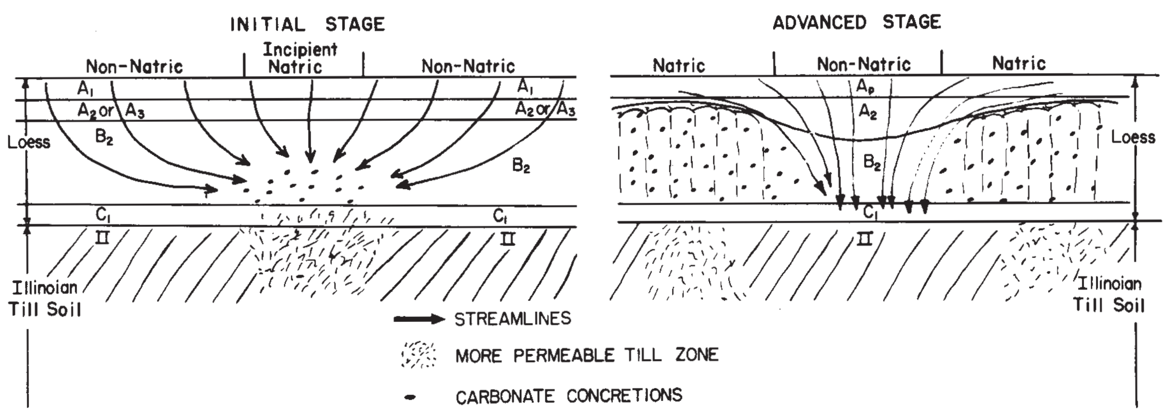

***Figure 16.*—Movement of moisture in soils that contain natric horizons.**

lations of exchangeable sodium, they became nearly impervious, and movement of moisture through those horizons became very slow. During wet seasons, these B horizons were not saturated, or they became saturated much more slowly than the B horizons of associated soils. The moisture gradient between soils that contain natric horizons and soils that lack such horizons favors the movement of salts into the subsoil of natric soils and the preservation of salts that previously had accumulated. Because of this mechanism, dispersion of the B horizons has progressed, both laterally and vertically, from the point of initial dispersion.

Upward migration of dispersed material of the B horizons from the initial point of dispersion has resulted as a consequence of the very slow permeability, which averages only 0.017 inch per hour, according to studies made by Frazee and others (*6*). The zones where dispersion is taking place are seldom saturated with water, even during wet seasons, and hence are subjected to severe drying late in summer. Solutions of salts that move vertically through the soil are intercepted and subsequently are concentrated along the upper boundary of these zones. Through repeated cycles of this process, the horizon that is dispersed with sodium gradually migrates upward to within a few inches of the soil surface. This explains why the depth to the subsoil in soils that contain natric horizons is so shallow, even in nearly level or uneroded areas. It also explains why plowing of these soils to a normal depth often pentrates the subsoil and incorporates material from the subsoil into the plow layer.

Development of a dispersed horizon results in an inversion of the drainage characteristics (permeability), in that a soil that originally was the most permeable becomes the least permeable after dispersion takes place (see fig. 16, advanced stage). Soils with which natric soils occur receive a considerably greater volume of water than they normally would receive through rainfall because they also receive water that moves laterally to them from the soils that contain nearly impermeable natric horizons. This may provide a mechanism that limits the lateral expansion of soils that contain natric horizons. It functions if drainage of the associated soils is good enough to leach out of the profile excess sodium salts that originated from the perched water table of adjacent natric soils.

The foregoing paragraphs explain why soils that contain natric horizons are closely intermingled with other soils. Soils that contain natric horizons are most extensive in the southeastern part of Montgomery County, where they occupy nearly 50 percent of some areas of upland prairies. To the north and west, the acreage of these soils becomes progressively smaller, and those soils occupy less than 1 percent of the total acreage in the northwestern part of the county. This pattern of occurrence of these soils is caused by the decrease in soil weathering and in accumulation of sodium, as the layer of loess becomes progressively thicker from the southeastern part of the county to the northwestern part.

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus, in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and later revised (*24*). The system currently used was adopted for general use by the National Cooperative Survey in 1965. The current system is under continual study. Therefore, readers interested in developments of the current system should search the latest literature available (*23*, *25*). The soil series in Montgomery County are placed in some categories of the current system and in the great soil groups of the older system in table 9.

In the current system, the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen so that the soils of similar genesis, or mode of origin, are grouped together. Six categories make up the current system. Beginning with the broadest, these are order, suborder, great group, subgroup, family, and series. The classes of the current system are briefly defined in the following paragraphs.

ORDER.—Ten soil orders are recognized. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate these soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are the Entisols and Histosols, which occur in many different kinds of climate. The three orders in Montgomery County are Alfisols, Mollisols, and Inceptisols.

Alfisols have a distinct accumulation of clay in the B horizon and have a base saturation of more than 35 percent. The base saturation increases with increasing depth.

Mollisols have formed under grass and have a thick, friable, dark-colored surface layer that is well supplied with bases. The name is derived from the Latin word *mollis*, meaning soft.

Inceptisols generally form on young, but not recent, land surfaces. Their name is derived from the Latin word *inceptum*, meaning beginning. It indicates that the development of these soils is just beginning.

SUBORDER.—Each order is subdivided into groups (suborders) that are based mostly on soil characteristics that seem to produce classes having the greatest similarity from the standpoint of their genesis. Suborders narrow the broad climatic range of soils that are in orders.

Soil characteristics used to separate suborders mainly reflect either the presence or absence of waterlogging, or soil differences produced through the effects of climate or vegetation. The names of suborders contain two syllables, the last of which indicates the order. An example is Aquepts (*Aqu*, meaning water or wet, and *ept*, from Inceptisol).

GREAT GROUP.—Soil suborders are separated into great groups on the basis of uniformity in kinds and sequences

TABLE 9.—*Classification of soil series in Montgomery County, Ill.*

Soil series	Family	Subgroup	Order	Great soil group of the 1938 system
Blair	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Camden	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Chauncey	Fine, montmorillonitic, mesic	Argiaquic Argialbolls	Mollisols	Planosols.
Cisne	Fine, montmorillonitic, mesic	Mollic Albaqualfs	Alfisols	Planosols.
Clarksdale	Fine, montmorillonitic, mesic	Udollic Ochraqualfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Brunizems.
Colo	Fine-silty, mixed, noncalcareous, mesic.	Cumulic Haplaquolls	Mollisols	Alluvial soils.
Cowden	Fine, montmorillonitic, mesic	Mollic Albaqualfs	Alfisols	Planosols.
Douglas	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols	Brunizems.
Ebbert	Fine-silty, mixed, mesic	Argiaquic Argialbolls	Mollisols	Humic Gley soils intergrading toward Planosols.
Harrison	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols	Brunizems.
Harvel	Fine-silty, mixed, noncalcareous, mesic.	Typic Haplaquolls	Mollisols	Humic Gley soils.
Hennepin	Fine-loamy, mixed, mesic	Typic Eutrochrepts	Inceptisols	Regosols.
Herrick	Fine-montmorillonitic, mesic	Argiaquic Argialbolls	Mollisols	Brunizems intergrading toward Planosols.
Hickory	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Hosmer	Fine-silty, mixed, mesic	Typic Fragiudalfs	Alfisols	Gray-Brown Podzolic zoils.
Hoyleton	Fine, montmorillonitic, mesic	Aquollic Hapludalfs	Alfisols	Planosols intergrading toward Brunizems.
Huey	Fine-silty, mixed, mesic	Typic Natraqualfs	Alfisols	Solonetz soils.
Ipava	Fine, montmorillonitic, mesic	Aquic Argiudolls	Mollisols	Brunizems.
Landes	Coarse-loamy, mixed, mesic	Fluventic Hapludolls	Mollisols	Alluvial soils.
Lawson	Fine-silty, mixed, mesic	Cumulic Hapludolls	Mollisols	Alluvial soils.
Negley	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Nokomis	Fine-loamy, mixed, mesic	Udollic Ochraqualfs	Alfisols	Brunizems. [1]
Oconee	Fine, montmorillonitic, mesic	Udollic Ochraqualfs	Alfisols	Planosols intergrading toward Brunizems.
O'Fallon	Fine-silty, mixed, mesic	Aquic Argiudolls	Mollisols	Brunizems.
Pana	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols	Brunizems.
Piasa	Fine, montmorillonitic, mesic	Mollic Natraqualfs	Alfisols	Solonetz soils.
Pike	Fine-silty, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Racoon	Fine-silty, mixed, mesic	Typic Ochraqualfs	Alfisols	Planosols.
Radford	Fine-silty, mixed, mesic	Fluventic Hapludolls	Mollisols	Alluvial soils.
Shiloh	Fine, montmorillonitic, noncalcareous, mesic.	Cumulic Haplaquolls	Mollisols	Humic Gley soils.
Sicily	Fine-silty, mixed, mesic	Mollic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Brunizems.
Starks	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Stoy	Fine-silty, mixed, mesic	Albaquic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils.
Tamalco	Fine, montmorillonitic, mesic	Typic Natrudalfs	Alfisols	Solonetz soils.
Terril	Fine-loamy, mixed, mesic	Cumulic Hapludolls	Mollisols	Brunizems.
Velma	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols	Brunizems.
Virden [2]	Fine, montmorillonitic, noncalcareous, mesic.	Typic Argiaquolls	Mollisols	Humic Gley soils.
Walshville	Fine, mixed, mesic	Typic Natrudalfs	Alfisols	Solonetz soils.
Weir	Fine, montmorillonitic, mesic	Typic Ochraqualfs	Alfisols	Planosols.

[1] Brunizems intergrading toward Gray-Brown Podzolic soils.
[2] Included with the Virden soils in Montgomery County are some Typic Haplaquolls, fine-silty, mixed, mesic, which resemble the Sable soils mapped in counties to the north.

of major soil horizons and other features. The horizons used as a basis for distinguishing between great groups are those in which (1) clay, iron, or humus has accumulated; (2) pans that interfere with growth of roots, movement of water, or both, have formed; or (3) a thick, dark-colored surface horizon has developed. The other features commonly used are the self-mulching properties of clay, temperature of the soil, major differences in chemical composition (mainly the bases calcium, magnesium, sodium, and potassium), or the dark-red or dark-brown colors associated with soils formed in material weathered from basic rocks.

Names of the great groups consist of three or four syllables. They are made by adding a prefix to the name of the suborder. An example is Haplaquoll (*Hapl* meaning minimum horizon, and *aquoll*, meaning dark soils seasonally saturated with water). The great group is not shown separately in table 9, because it is the last word in the name of the subgroup.

SUBGROUP.—Great soil groups are subdivided into subgroups. One of these represents the central, or typic, segment of the group. Other subgroups have properties of the group but have one or more properties of another great group, suborder, or order, and these are called intergrades. Also, subgroups may be established for soils having properties that intergrade outside the range of any other great group, suborder, or order. The names of subgroups are formed by placing one or more adjectives ahead of the name of the great group. An example is Cumulic Haplaquolls.

Family.—Families are separated within a subgroup, primarily on the basis of properties that are important to the growth of plants or to the behavior of soils used for engineering. The main properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. The names of families consist of a series of adjectives that precede the name of a subgroup. The adjectives used are the class names for soil texture, mineralogy, and so on (see table 9). An example is the fine-silty, mixed, mesic family of Cumulic Haplaquolls. All the soils in Montgomery County are in the mesic family. They have soil temperatures of 47 to 59 degrees Fahrenheit at a depth of 20 inches, and summer and winter temperatures that differ more than 9 degrees Fahrenheit.

Laboratory Data for Selected Soil Profiles

Physical and chemical laboratory data considered representative for selected soil profiles in Montgomery County are given in table 10. These data are useful to soil scientists in classifying soils and in developing concepts of soil genesis. They are helpful for estimating fertility, tilth, and other properties that affect soil management, and they also serve as a check against field estimates and determinations. The soils sampled are those of the Douglas, Harrison, Piasa, and Tamalco series. Profiles of the Piasa and Tamalco soils are described in the section "Descriptions of the Soils." Profile descriptions of the Douglas and Harrison soils follow:

Table 10.—*Laboratory data for selected soil profiles*

[Laboratory analysis were made by members of the Department of Agronomy, University of Illinois]

Soil type and location	Horizon	Depth	Particle-size distribution			Organic carbon [1]	Exchangeable cations [2] (meq. per 100 gm. of soil)				Cation-exchange capacity	Base saturation	pH
			Sand (2.0–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)		Ca	Mg	K	Na			
		In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*						*Pct.*	
Douglas silt loam: T.	Ap	0–8	3. 3	74. 5	22. 2	1. 69	10. 5	1. 8	0. 4	0. 1	15. 5	83	6. 2
9 N., R. 4 W., sec.	A1	8–12	1. 8	71. 3	26. 9	1. 33	8. 5	2. 8	. 3	. 1	16. 9	69	5. 5
9, SW160, NW40,	B1	12–17	1. 5	68. 1	30. 4	. 97	8. 8	4. 7	. 3	. 1	18. 9	74	5. 3
SW10.	B21	17–24	1. 1	67. 4	31. 5	. 79	8. 8	5. 7	. 4	. 1	19. 8	76	5. 3
	B22	24–31	1. 3	71. 4	27. 3	. 64	7. 5	5. 2	. 3	. 1	17. 2	77	5. 2
	B31	31–39	2. 1	72. 6	25. 3	. 58	7. 4	5. 2	. 3	. 1	16. 4	79	5. 2
	IIB32	39–47	18. 4	61. 4	20. 2	. 07	6. 1	4. 3	. 2	. 1	12. 9	83	5. 2
	IIIC	47–62	31. 8	51. 1	17. 1	. 18	4. 8	3. 5	. 2	. 1	10. 2	84	5. 4
Harrison silt loam:	Ap	0–8	2. 9	77. 7	19. 4	1. 27	9. 1	2. 6	. 3	. 1	14. 9	82	6. 0
T. 10 N., R. 4 W.,	B1	8–13	1. 6	70. 0	28. 4	. 91	9. 7	4. 4	. 4	. 1	18. 2	80	5. 7
sec. 7, NE160,	B21	13–18	1. 7	65. 7	32. 6	. 73	10. 8	6. 8	. 4	. 1	22. 0	82	5. 6
SW40, NW10.	B22	18–26	1. 5	65. 8	32. 7	. 61	10. 4	7. 9	. 4	. 1	22. 5	84	5. 7
	B31	26–35	1. 7	69. 9	28. 4	. 44	8. 9	7. 4	. 4	. 1	20. 0	84	5. 6
	B32	35–46	4. 2	71. 9	23. 9	. 33	7. 7	6. 6	. 3	. 2	17. 2	86	5. 6
	C1	46–52	9. 5	70. 0	20. 5	. 22	6. 9	5. 7	. 2	. 2	14. 9	87	5. 7
	IIC2	52–57	17. 7	64. 2	18. 1	. 18	6. 0	5. 0	. 2	. 2	13. 2	86	5. 7
	IIIC3	57–62	27. 6	57. 5	14. 9	. 15	4. 8	4. 0	. 1	. 2	10. 7	84	5. 9
Piasa silt loam: [3]	Ap	0–8	6. 7	82. 3	11. 0	1. 09	7. 8	2. 6	. 1	. 8	9. 1	123	6. 6
T. 9 N., R. 4 W.,	A2	8–12	6. 7	72. 9	20. 4	. 51	7. 5	6. 3	. 2	2. 0	14. 0	114	7. 4
sec. 26, NE160,	B21t	12–16	6. 8	61. 6	31. 6	. 47	9. 8	10. 8	. 4	3. 6	19. 0	131	7. 6
NE40, NE10.	B22t	16–20	2. 9	55. 9	41. 2	. 45	11. 6	14. 6	. 5	6. 0	26. 6	121	7. 7
	B23t	20–26	2. 6	57. 4	40. 0	. 37	12. 4	14. 5	. 5	6. 9	27. 0	124	8. 0
	B24t	26–33	3. 3	62. 1	34. 6	. 27	10. 5	12. 6	. 4	6. 4	23. 5	121	7. 9
	B3	33–37	2. 8	68. 1	29. 1	. 22	9. 5	10. 4	. 4	5. 4	19. 5	128	7. 8
	C1	37–48	2. 9	72. 0	25. 1	. 14	8. 2	8. 6	. 3	3. 3	16. 8	119	7. 7
	IIC2	48–55	14. 4	63. 2	22. 4	. 13	8. 2	7. 4	. 2	2. 0	15. 2	113	7. 4
Tamalco silt loam: [3]	Ap	0–6	6. 7	76. 7	16. 6	1. 86	4. 8	2. 7	. 1	. 2	13. 6	56	4. 9
T. 9 N., R. 4 W.,	A2	6–9	5. 6	73. 0	21. 4	1. 09	3. 1	2. 4	. 1	. 4	14. 4	43	4. 9
sec. 26, NE160,	B&A	9–11	3. 6	68. 6	27. 8	. 94	4. 2	3. 8	. 2	1. 1	17. 1	55	5. 0
NW40, NW10.	B21t	11–17	2. 4	55. 0	42. 6	1. 09	7. 8	8. 7	. 4	2. 8	27. 9	70	5. 4
	B22t	17–28	2. 8	63. 9	33. 3	. 39	10. 1	11. 2	. 6	4. 7	25. 5	98	7. 4
	B3t	28–35	3. 5	72. 9	23. 6	. 20	8. 1	8. 2	. 3	4. 6	18. 0	111	7. 9
	C	35–42	8. 8	71. 6	19. 6	. 19	6. 9	6. 6	. 2	3. 4	14. 4	119	8. 2
	IIA1b	42–54	23. 2	59. 9	16. 9	. 15	5. 4	4. 9	. 2	2. 1	11. 8	105	8. 0
	IIBb	54–60	30. 0	52. 1	17. 9	. 13	5. 6	5. 2	. 2	1. 5	11. 8	105	7. 9

[1] The percentage of organic carbon times 1.724 equals the percentage of organic matter.

[2] One milliequivalent of calcium (Ca) per 100 grams of soil material equals 400 pounds per acre, or per 2 million pounds of soil material, 1 milliequivalent of magnesium (Mg) per 100 grams of soil material equals 240 pounds per acre, or per 2 million pounds of soil material; 1 milliequivalent of potassium (K) per 100 grams of soil material equals 780 pounds per acre, or per 2 million pounds of soil material.

[3] A detailed description of the soil profile at this site appears in the section "Descriptions of the Soils."

Profile of Douglas silt loam (40 feet north and 18 feet east of corner post adjacent to walnut tree in about the SW. corner of the NW40 SW160, sec. 9, T. 9 N., R. 4 W.; laboratory numbers 19825 to 19832, inclusive):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; abrupt, smooth boundary.

A1–8 to 12 inches, very dark grayish-brown (10YR 3/2) and dark-brown (10YR 4/3) silt loam; strong, fine to coarse, granular structure; friable; clear, smooth boundary.

B1—12 to 17 inches, dark-brown (10YR 4/3) and dark yellowish-brown (10YR 4/4) heavy silt loam that is dark yellowish brown (10YR 4/4) if crushed; strong, coarse, granular to fine, subangular blocky structure; dark-brown (10YR 3/3) coatings on the peds; slightly firm; clear, smooth boundary.

B21—17 to 24 inches, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/4) light silty clay loam; strong, fine to medium, subangular blocky structure; nearly continuous, dark-brown (10YR 3/3) coatings on the peds; firm; gradual, smooth boundary.

B22—24 to 31 inches, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/4) light silty clay loam; moderate, medium, subangular blocky structure; patchy, dark-brown (10YR 3/3) coatings on the peds; slightly firm; gradual, smooth boundary.

B31—31 to 39 inches, brown (7.5YR 4/4) to yellowish-brown (10YR 5/4) heavy silt loam; few, fine, distinct, light brownish-gray (10YR 6/2) mottles; weak, medium to coarse, subangular blocky structure; few, thin, patchy, dark-brown (7.5YR 3/2) coatings on the peds; friable; clear, smooth boundary.

IIB32[1]—39 to 47 inches, brown (7.5YR 4/4) gritty silt loam; very weak, coarse, subangular blocky structure; some fine, black specks; slightly firm; gradual, smooth boundary. (Considered to be Farmdale loess.)

IIIC—47 to 62 inches, brown (7.5YR 4/4) gritty silt loam; very weak, coarse, angular to subangular blocky structure; slightly firm. (Considered to be Illinoian glacial drift.)

Profile of Harrison silt loam (240 feet east and 123 feet south of the NW. corner of the SW40 of NE160, sec. 7, T. 10 N., R. 4 W.; laboratory numbers 19806 to 19814, inclusive):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine to medium, granular structure; friable; abrupt, smooth boundary.

B1—8 to 13 inches, dark-brown (10YR 3/3) to brown (10YR 4/3) silt loam; brown (10YR 4/3) if crushed and has very dark grayish-brown (10YR 3/2) coatings on the peds; moderate, coarse, granular to moderate, fine, subangular blocky structure; friable; clear, smooth boundary.

B21—13 to 18 inches, brown (10YR 4/3) silty clay loam; brown (10YR 4/3) if crushed and has dark-brown (10YR 3/3) to very dark grayish-brown (10YR 3/2) coatings on the peds; weak, medium, subangular blocky structure breaking to moderate, coarse, granular structure; slightly firm; clear, smooth boundary.

B22—18 to 26 inches, dark-brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) silty clay loam; few, fine, prominent, strong-brown (7.5YR 5/6) mottles and a few, fine, faint, light brownish-gray (10YR 6/2) mottles; dark grayish-brown (10YR 4/2) clay coatings on the peds; moderate, medium, subangular blocky structure; slightly firm; some black (10YR 2/1) iron and manganese concretions; gradual, smooth boundary.

B31—26 to 35 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4) heavy silt loam; common, fine, distinct, dark-brown (7.5YR 4/4) and strong-brown (7.5YR 5/6) mottles; dark grayish-brown (10YR 4/2) coatings on the peds; weak, medium to coarse, subangular blocky structure; slightly firm; some iron concretions; gradual, smooth boundary.

B32—35 to 46 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4) silt loam; common, fine, distinct, dark-brown (7.5YR 4/4) to strong-brown (7.5YR 5/6) mottles and common, fine, faint, light brownish-gray (10YR 6/2) mottles; dark grayish-brown (10YR 4/2) coatings on the peds; weak, coarse, subangular blocky structure; friable; few black (7.5YR 2/1) concretions; gradual, smooth boundary.

C1—46 to 52 inches, mixed light brownish-gray (10YR 6/2) and dark yellowish-brown (10YR 5/6) silt loam; some grit; dark-brown (7.5YR 4/2) coatings on the peds; very weak, coarse, subangular blocky structure; friable; few black (10YR 2/1) concretions; clear, smooth boundary.

IIC2—52 to 57 inches, dark-brown (7.5YR 4/2 to 4/4) silt loam; some grit; few, fine, faint, strong-brown (7.5YR 5/6) mottles and a few, fine, distinct, light brownish-gray (10YR 6/2) mottles; weak, coarse, angular blocky structure; friable; a few dark concretions; gradual, smooth boundary. (Farmdale loess.)

IIIC3—57 to 62 inches, dark yellowish-brown (7.5YR 4/4) gritty silt loam; common, medium, distinct, dark-brown (7.5YR 3/2) mottles and a few, medium, faint, strong-brown (7.5YR 5/6) mottles; dark grayish-brown (10YR 4/2) to grayish-brown (10YR 5/2) clay films; weak, thick, platy structure; firm.

[1] In this profile the layer of Peorian loess, above the Farmdale loess, is somewhat thinner than normal.

Field and Laboratory Methods

The samples used to determine the data in table 10 were collected from carefully selected pits. All laboratory analyses were made on ovendry material that had passed a 2-millimeter sieve. The soils were analyzed by the Department of Agronomy of the University of Illinois. Standard methods were used.

Determinations of the amount of clay were made by the pipette method (*14, 15, 19*). Reaction of the saturated paste was measured with a glass electrode. Organic carbon was determined by wet combustion, using a modification of the Walkley-Black method (*20*). The cation-exchange capacity was determined by direct distillation of absorbed ammonia (*20*). To determine extractable calcium and magnesium, calcium was separated as calcium oxalate, and magnesium as magnesium ammonium phosphate (*20*). Extractable potassium was determined on the original extracts with a flame spectrophotometer.

Literature Cited

(1) American Association of State Highway Officials.
1961. Standard specifications for highway materials and methods of sampling and testing. Ed. 8, 2 v., illus.

(2) Baldwin, Mark, Kellogg, Charles E., and Thorp, James.
1938. Soil classification. U.S. Dept. Agr. Ybk. 1938: 979–1001.

(3) Barger, G. L., Shaw, R. H., and Dale, R. F.
1959. Chances of receiving selected amounts of precipitation in the north central region of the United States. Agr. Expt. Sta., Iowa State Univ., 277 pp.

(4) Broadfoot, W. M.
1960. Field guide for evaluating cottonwood sites. USDA South For. Expt. Sta. Occas. Paper 178, 6 pp., illus.

(5) Fehrenbacher, J. B., Wilding, L. P., Odell, R. T., and Melsted, S. W.
1963. Characteristics of solonetzic soils in Illinois. Soil Sci. Soc. Amer. Proc. 27: 421–431.

(6) Frazee, C. J., Odell, R. T., and Fehrenbacher, G. B.
1968. Moisture regimes in solonetzic and associated soils in south-central Illinois. Soil Sci. 105: 362–368.

(7) FRYE, J. C., GLASS, H. D., and WILLMAN, H. E.
1962. STRATIGRAPHY AND MINERALOGY OF THE WISCONSINAN LOESSES OF ILLINOIS. Ill. State Geol. Survey Cir. 334, 55 pp., illus.

(8) GROSSMAN, R. B., FEHRENBACHER, J. B., and BEAVERS, A. H.
1959. FRAGIPAN SOILS OF ILLINOIS: I, II, III. Soil Sci. Soc. Amer. Proc. 23: 65–75.

(9) HORBERG, LELAND.
1950. BEDROCK TOPOGRAPHY OF ILLINOIS. Ill. State Geol. Survey. Bul. 73, 111 pp., illus.

(10) HUFF, F. A. AND CHANGNON, S. A.
1959. HAIL CLIMATOLOGY OF ILLINOIS. Ill. State Water Survey. Rpt. of Invest. No. 38, 46 pp.

(11) ILLINOIS TECHNICAL FORESTRY ASSOCIATION.
1952. FOREST PLANTING PRACTICES FOR ILLINOIS. Rev. 1957. 35 pp., illus.

(12) ———
1956. RECOMMENDED FOREST PRACTICES FOR ILLINOIS HARDWOOD TIMBER TYPES. Rev. 1957. 16 pp.

(13) JOOS, L. A.
1960. FREEZE PROBABILITIES IN ILLINOIS. Ill. Agr. Expt. Sta. in cooperation with U.S. Weather Bur. Bul. 650, 16 pp., illus.

(14) KILMER, V. J. and ALEXANDER, L. T.
1949. METHODS OF MAKING MECHANICAL ANALYSES OF SOILS. Soil Sci. 68: 15–24.

(15) ——— and MULLINS, J. F.
1954. IMPROVED STIRRING AND PIPETTING APPARATUS FOR MECHANICAL ANALYSIS OF SOILS. Soil Sci. 77: 437–441.

(16) KOSANKE, R. M., SIMON, J. A., WANLESS, H. R., and WILLMAN, H. B.
1960. CLASSIFICATION OF THE PENNSYLVANIA STRATA OF ILLINOIS. Ill. State Geol. Survey, Rpt. of Invest. 214, 84 pp., illus.

(17) LEIGHTON, M. M. and BROPHY, J. A.
1961. ILLINOIAN GLACIATION IN ILLINOIS. Jour. Geol. 69: 1–31, illus.

(18) ———, EKBLAW, G. E., and HORBERG, L.
1948. PHYSIOGRAPHIC DIVISIONS OF ILLINOIS. Ill. State Geol. Survey, Dept. of Invest. No. 129, 33 pp., illus.

(19) OLMSTEAD, L. B., ALEXANDER, L. T., and MIDDLETON, H. E.
1930. A PIPETTE METHOD OF MECHANICAL ANALYSIS OF SOILS BASED ON IMPROVED DISPERSION PROCEDURE. U.S. Dept. Agr. Tech. Bul. 170, 22 pp., illus.

(20) PEECH, MICHAEL, ALEXANDER, L. T., DEAN, L. A., and REED, J. FIELDING.
1947. METHODS OF SOIL ANALYSIS FOR SOIL-FERTILITY INVESTIGATIONS. U.S. Dept. Agr. Cir. 757, 25 pp.

(21) PORTLAND CEMENT ASSOCIATION.
1962. PCA SOIL PRIMER. 52 pp., illus. Chicago, (Rev.)

(22) SCHNUR, G. L.
1937. YIELD, STAND, AND VOLUME TABLES FOR EVEN-AGED UPLAND OAK FORESTS. USDA Tech. Bul. 560, 88 pp., illus.

(23) SIMONSON, ROY W.
1962. SOIL CLASSIFICATION IN THE UNITED STATES. Sci. 137: 1027–1034.

(24) THORP, JAMES and SMITH, GUY D.
1949. HIGHER CATEGORIES OF SOIL CLASSIFICATION: ORDER, SUBORDER, AND GREAT SOIL GROUPS. Soil Sci. 67: 117–126.

(25) UNITED STATES DEPARTMENT OF AGRICULTURE.
1960. SOIL CLASSIFICATION, A COMPREHENSIVE SYSTEM. 7th Approximation. Soil Survey Staff, Soil Conservation Service, 265 pp., illus. (Supplement issued in March 1967)

(26) WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS.
1960. THE UNIFIED SOIL CLASSIFICATION SYSTEM. Tech. Memo. 3–357, 2 v.

(27) WILDING, L. P., ODELL, R. T., FEHRENBACHER, J. B., and BEAVERS, A. H.
1963. SOURCE AND DISTRIBUTION OF SODIUM IN SOLONETZIC SOILS IN ILLINOIS. Soil Sci. Soc. Amer. Proc. 27: 432–438, illus.

(28) WILLMAN, H. B., GLASS, H. D., and FRYE, J. C.
1963. MINERALOGY OF GLACIAL TILLS AND THEIR WEATHERING PROFILES IN ILLINOIS. Ill. State. Geol. Survey, Cir. 347, 55 pp., illus.

Glossary

Acidity. See Reaction, soil.

Aeration, soil. The process by which air and other gases in the soil are renewed. The rate of soil aeration depends largely on the size and number of pores in the soil and on the amount of water that clogs the pores.

Aggregate, soil. A single mass or cluster consisting of many primary soil particles held together, such as a clod, crumb, block, or prism.

Alluvium. Soil material that has been transported and deposited by water.

Available moisture capacity. The capacity of a soil to hold water in a form available to plants. The amount of moisture held in a soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension. Terms for available moisture capacity given in this survey (determined to a depth of 60 inches) are the following: *Very high*—12 inches or more; *high*—9 to 12 inches; *moderate*—6 to 9 inches; *low*—3 to 6 inches; and *very low*—less than 3 inches.

Base saturation. The degree to which soil material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Cation-exchange capacity. A measure of the total amount of exchangeable cations that can be held by a soil. It is expressed in terms of milliequivalents per 100 grams of soil material that is neutral in reaction (pH 7.0) or at some other stated pH value. (Formerly called base-exchange capacity.)

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Claypan. A compact, slowly permeable soil horizon that contains more clay than the horizon above and below it. A claypan is commonly hard when dry and plastic or stiff when wet.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; will not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production; a crop grown between trees and vines in orchards and vineyards.

Crop residue. That part of a plant, or crop, left in the field after harvest.

Depth of soil. Thickness of soil over a specified layer, generally a layer that does not permit the growth of roots. Classes used in this soil survey to indicate depth are the following: *Deep*—36 inches or more; *moderately deep*—20 to 36 inches; *shallow*—10 to 20 inches; and *very shallow*—less than 10 inches.

Diversion (ditch). A broad-bottomed ditch, used to divert runoff so that it will flow around the slope to a safe outlet. (See Terrace.) A ridge of earth, generally a terrace, that is built to divert runoff from its natural course, and thus to protect areas downslope from the effects of such runoff.

Drainage, natural. Refers to the conditions that existed during the time the soil was developing, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but can be caused by the sudden deepening of a channel or the blocking of a drainage outlet. The following classes of natural drainage are recognized:

Excessively drained soils are commonly very porous and rapidly permeable, and they have low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and in podzolic soils they commonly have mottles below a depth of 6 to 16 inches in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods, are light gray, and generally are mottled from the surface downward, though mottling may be absent, or nearly so, in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Fragipan. A dense and brittle pan, or layer, that owes its hardness mainly to extreme density or compactness rather than to content of much clay or cementation. Fragments that are removed are friable, but the material in place is so dense that roots cannot penetrate it and water moves through it very slowly by following vertical channels and cleavage planes.

Genesis, soil. The manner in which a soil originated, with special reference to the processes responsible for the development of the solum, or true soil, from the unconsolidated parent material.

Glacial drift. Rock material transported by glacial ice and then deposited; also includes the assorted and unassorted materials deposited by streams flowing from glaciers.

Glacial till. Unstratified glacial drift that consists of clay, silt, sand, gravel, and boulders transported and deposited by glacial ice.

Grassed waterway. A waterway planted to grass to protect against erosion; some are graded or shaped to conduct runoff.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residue.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active, and it is therefore marked by an accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has (1) distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but can be immediately beneath the A or B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. May be limited by either the infiltration capacity of the soil or by the rate at which water is applied to the soil surface.

Lacustrine deposit. Material deposited in lake water and exposed by the lowering of the water level or elevation of the land.

Leached soil. A soil from which most of the soluble material has been removed from the entire profile or has been removed from one part of the profile and has accumulated in another part.

Lime concretion. An aggregate cemented by precipitation of calcium carbonate.

Litter, forest. A surface layer of loose, organic debris in forests. It consists of freshly fallen or slightly decomposed organic materials.

Loam. (1) Soil containing a relatively even mixture of sand and silt and a somewhat smaller proportion of clay, generally a desirable quality. May be subdivided into textural classes, such as sandy loam, loam, silt loam, and clay loam. (2) Specifically, soil material containing 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Loess. A fine-grained windblown deposit consisting dominantly of silt-sized particles.

Massive. Large, uniform masses of cohesive soil, in some places with ill-defined and irregular breakage, as in some of the fine-textured alluvial soils; structureless.

Medium-textured soil. Soil of very fine sandy loam, loam, silt loam, or silt texture.

Morphology, soil. The makeup of the soil, including the texture, structure, consistence, color, and other physical, mineralogical, and biological properties of the various horizons that make up the soil profile.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and poor drainage. Descriptive terms are as follows: Abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Organic matter. A general term for plant and animal matter, in or on the soil, in all stages of decomposition. Readily decomposed organic matter is often distinguished from the more stable forms that are past the stage of rapid decomposition. Following are terms used in this soil survey to describe the content of organic matter: *Very low*—below 1 percent, by weight; *low*—1 to 2 percent; *moderate*—2 to 4 percent; and *high*—more than 4 percent.

Outwash, glacial. The material swept out, sorted, and deposited beyond the glacial ice front by streams of melt water. In this county it consists of sediment, in many places sandy and gravelly, deposited in layers on terraces.

Pan. A layer in a soil that is firmly compacted or very rich in clay. Frequently the word "pan" is combined with other words that more explicitly indicate the nature of the layers; for example, *hardpan*, *fragipan*, and *claypan*.

Parent material, soil. The disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, prism, or block, in contrast to a clod, which is a mass of soil brought about by digging or other disturbance.

Percolation. The downward movement of water through the soil, especially the downward flow of water in saturated or nearly saturated soil.

Permeability, soil. The quality of a soil that enables it to transmit air and water. The following relative classes of soil permeability, used in this soil survey, refer to estimated rates of movement of water in inches per hour through saturated, undisturbed cores under a one-half inch head of water:

	Inches per hour		*Inches per hour*
Very slow	Less than 0.06	Moderate	0.63–2.00
Slow	0.06–0.20	Moderately rapid	2.00–6.3
Moderately slow	0.20–0.63	Rapid	6.3–20.0

Poorly graded. A soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles in poorly graded soil material, density can be increased only slightly by compaction.

Porosity, soil. The percentage of the soil (or rock) volume that is not occupied by solid particles, including all pore spaces filled with air and water.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. As a soil separate, individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz, but sand may be of any mineral composition. As a textural class, soil material that is 85 percent or more sand and not more than 10 percent clay.

Silt. As a soil separate, individual mineral particles in a soil that range from the upper limit of clay (0.002 millimeter) in diameter to the lower limit of very fine sand (0.05 millimeter). As a textural class, soil material that is 80 percent or more silt and less than 12 percent clay.

Slope classes. Soil slope is normally measured by using a hand level and is expressed in terms of percentage—the difference in elevation in feet for each 100 feet horizontal. In this soil survey, the slope classes are not indicated in the map symbol for soils that are nearly level. In soils that are sloping, however, a capital letter following the soil type number shows the class of slope, for example, 134B. The slope classes generally have the following range in gradient: A, less than 2 percent; B, 2 to 4 percent; C, 4 to 7 percent; D, 7 to 12 percent; E, 12 to 18 percent; F, 18 to 30 percent; and G, more than 30 percent.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effects of climate and living matter acting upon parent material, as conditioned by relief over a period of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in a mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stratified. Composed of or arranged in strata, or layers, such as stratified alluvium. The term is confined to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing alternate strips of close-growing crops and clean-tilled crops or fallow on the contour.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C horizon.

Subsurface layer. Technically, the A2 horizon, which lies between the surface layer and the subsoil. This horizon has about the same texture as the A1 horizon, but it has a lighter color and is more strongly leached.

Surface layer. A term used in nontechnical soil descriptions for one or more layers above the subsoil. Generally coincides with the A horizon.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so that they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a soil. The basic textural classes, in order of increasing proportions of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially good soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.